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**EDGEWOOD ARSENAL
TECHNICAL REPORT**

**EATR 4365
FA R-1947**

**FIRE TESTS OF PRESERVATIVE-TREATED WOODEN
PACKING BOXES USED FOR 105-MM AMMUNITION**

Prepared by

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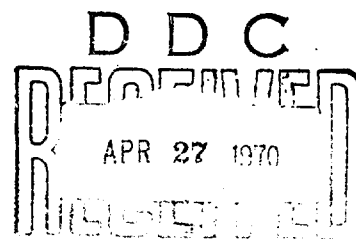
April 1970



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Field Evaluation Division
Edgewood Arsenal, Maryland 21010**

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DEPARTMENT OF THE ARMY
EDGEWOOD ARSENAL
Technical Support Directorate
Field Evaluation Division
Edgewood Arsenal, Maryland 21010

FOREWORD

The work described in this report was performed by direction of Headquarters, US Army Munitions Command. The work was started in March 1969 and completed in May 1969.

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LIGEST

This report covers an investigation to compare the fire hazards of untreated and preservative-treated wooden packing boxes used for ammunition. Based on test results, it is concluded that:

The water-repellent, wood-preservative treatment, specified in MIL-B-2427D for application to wooden packing boxes used for ammunition, does not increase the flammability of the wood.

Boxes constructed of ponderosa pine constitute more of a fire hazard than boxes constructed of southern yellow pine.

The fire hazard of the packing boxes is dependent upon the moisture content of the wood, and the water repellent part of the treatment may keep the wood drier, lighter in weight, and somewhat more flammable when subjected to intermittent rain showers.

Flammability of the boxes is also affected by the amount of organic volatiles present, including the solvent of the preservative solution until it finally evaporates, which occurs at a rate dependent upon the temperature and amount of ventilation; however, during the treating process, the solvent of the preservative solution extracts some of the naturally occurring volatiles in the wood, thus lowering the fire hazard.

The fire hazard of the preservative-treated packing boxes can be considerably reduced by applying an adequate thickness of fire-retardant paint coating to the exterior surfaces.

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FIRE TESTS OF PRESERVATIVE-TREATED WOODEN PACKING BOXES USED FOR 105-MM AMMUNITION

I. INTRODUCTION.

Shipping boxes and crates used for ammunition are usually constructed of wood with no appreciable inherent resistance to decay caused by fungi. Particularly during wartime, when deterioration of ammunition containers is extremely consequential, wooden boxes are stored outdoors and are subject to fungal decay that is especially rapid and serious in wet, tropical areas. For long-term resistance to decay, high retention and good penetration of the wood by effective chemicals, which can be achieved by pressure impregnations or long-time soaks, are required. However, it was shown by Verrall¹ that wooden building materials, exposed above ground, could be adequately protected against decay by short-time immersions in solutions of fungicides. Wooden packing boxes used for ammunition are stored outdoors above ground and their storage period is usually limited, i. e., years rather than decades. In order to determine whether short-time immersions in fungicidal solutions would also protect from decay boxes used for packing ammunition, a large-scale test was run on boxes so treated and exposed for 5 years in the Panama Canal Zone and 15 years in Mississippi and Wisconsin.^{2, 3, 4} It was found that several of the treating solutions, applied to the boxes as 3-minute dips, markedly prolonged the service life of the wooden shipping containers.

Untreated wooden boxes used for ammunition were reported to fail, because of fungal decay, in a little over a year when stored outdoors in South Vietnam. Therefore, an additional requirement⁵ for wooden ammunition packing boxes was instituted that the boxes, or shooks, be completely immersed for 1 minute in a mineral spirits solution⁶ containing either 5 percent pentachlorophenol or 2 percent (as copper) copper naphthenate. Since the pentachlorophenol solution is lower in cost, almost all of the boxes that are supplied are treated with that fungicide.

Recently, it was reported from South Vietnam that ammunition packing boxes that had been given the preservative treatment constituted a greater fire hazard than the untreated boxes previously procured. It was reported that, in ammunition dumps, piles of boxes (containing ammunition) that had been preservative treated were more easily ignited than the untreated boxes. In a quick-and-dirty test of pallets of empty boxes intentionally ignited by a propellant charge, the

fire extinguished itself in the pile of untreated boxes; whereas, the pallet of boxes that had been given the preservative treatment continued to burn.

The possible causes for the greater flammability of the preservative-treated boxes are discussed below:

It did not seem likely that the fungicide, pentachlorophenol, would contribute to the fire hazard. Bruce⁷ tested the effects of preservative treatments on the flammability of oak and concluded that pentachlorophenol and copper naphthenate would be expected to have little or no important fire effect after all volatile solvent is gone. Gooch and coworkers⁸ concluded that, with oil-type preservatives, pentachlorophenol reduces flame spread and contributes to the reduction of the overall fire hazard. However, it also appeared possible that residual solvent left in the wood boxes given the preservative treatment could be responsible for the fire hazard. Paintability of wood that has been treated with an oil preservative has been a problem because of the residual solvent. Panek⁹ pressure treated southern pine with pentachlorophenol-preservative solution made up in Stoddard solvent and found 67 percent of the solvent remaining in the wood after 30 days storage in an air-conditioned chamber with circulating air, and, 29 percent remaining after 7 days in a kiln at 140°F with circulating air. In both instances, there was too much residual solvent for an acceptably paintable surface; however, the problem is not as severe with only a short nonpressure immersion. Under controlled laboratory conditions, the preservative solution used for treating boxes is required to leave treated ponderosa pine with an acceptably paintable surface after drying for 24 hours. Nevertheless, preservative-treated boxes have caused bleeding of asphalt in the fiberboard tubes, used for packaging ammunition, that are placed in the wooden containers. Also, boxes that were treated weeks earlier and stored in igloos showed evidence of residual solvent by an oil-soluble-dye test. Thus, it appeared possible that large amounts of boxes, from the time of treatment, could be stored together in nonventilated or poorly ventilated locations, such as igloos and holds of ships, and still retain amounts of solvent that could increase the fire hazard. Further, another possible contributor to the increased fire hazard could be the water-repellent ingredient of the preservative solution which delays the moisture absorption of the wood. When wet by rain, the boxes treated would remain drier and more inflammable than untreated boxes, as the latter readily absorb liquid water from their surfaces.

This report presents the results of an investigation of the flammability of untreated and preservative-treated boxes. The purposes

of the investigation were to determine, experimentally, the cause of the increased flammability noted in Vietnam. Comparative burning tests were run on ammunition packing boxes, obtained from production lines, which had been preservative treated and that had not been so treated. Also, some supplementary fire tests were run on wooden sticks.

II. TEST METHODS.

Since there was no known standard technique for comparatively evaluating the flammability of wooden packing boxes, a method was developed for use in the test fields at Edgewood Arsenal. The stacking was based upon the Crib method¹⁰ that usually employs 24 wood specimens, each 3 by 1/2 by 1/2 inches, but was scaled up to the use of 10 boxes, each about 35 by 10 by 6 inches.

In each test, boxes to be compared were tested simultaneously under conditions that were as identical as possible. The boxes were arranged in groups of 10 each in a configuration considered most conducive to the propagation of burning; the ignition source was standardized (i.e., fixed in design and capacity); and a shelter was provided to minimize the effects of wind. Further, to eliminate any possible bias because of the location of the shelters and inadvertent differences in the construction of the shelter or ignition source, duplicate testing was generally performed in which the types of boxes in each shelter for one test were reversed in the succeeding test.

Details of the box stacking arrangement and the supporting test equipment follows:

A. Stack Configuration.

The 10 boxes of the type specified for a particular test were arranged in five levels, with the first level 11 inches above the ground, resting on cement blocks and bricks as shown in figure 1. At each level, there were two boxes, set parallel to each other, back to back (i.e., hinge to hinge), and 6 inches apart. Each higher level was perpendicular to the one on which it rested. Thus, in vertical projection, there was a 6- by 6-inch square in the center of the stack. The boxes in this configuration were set up in the center of the shelter.

B. Ignition Source.

The ignition source, as depicted in figure 2, consisted of eight propane-burning Pittsburgh-Universal burners (Fisher Scientific

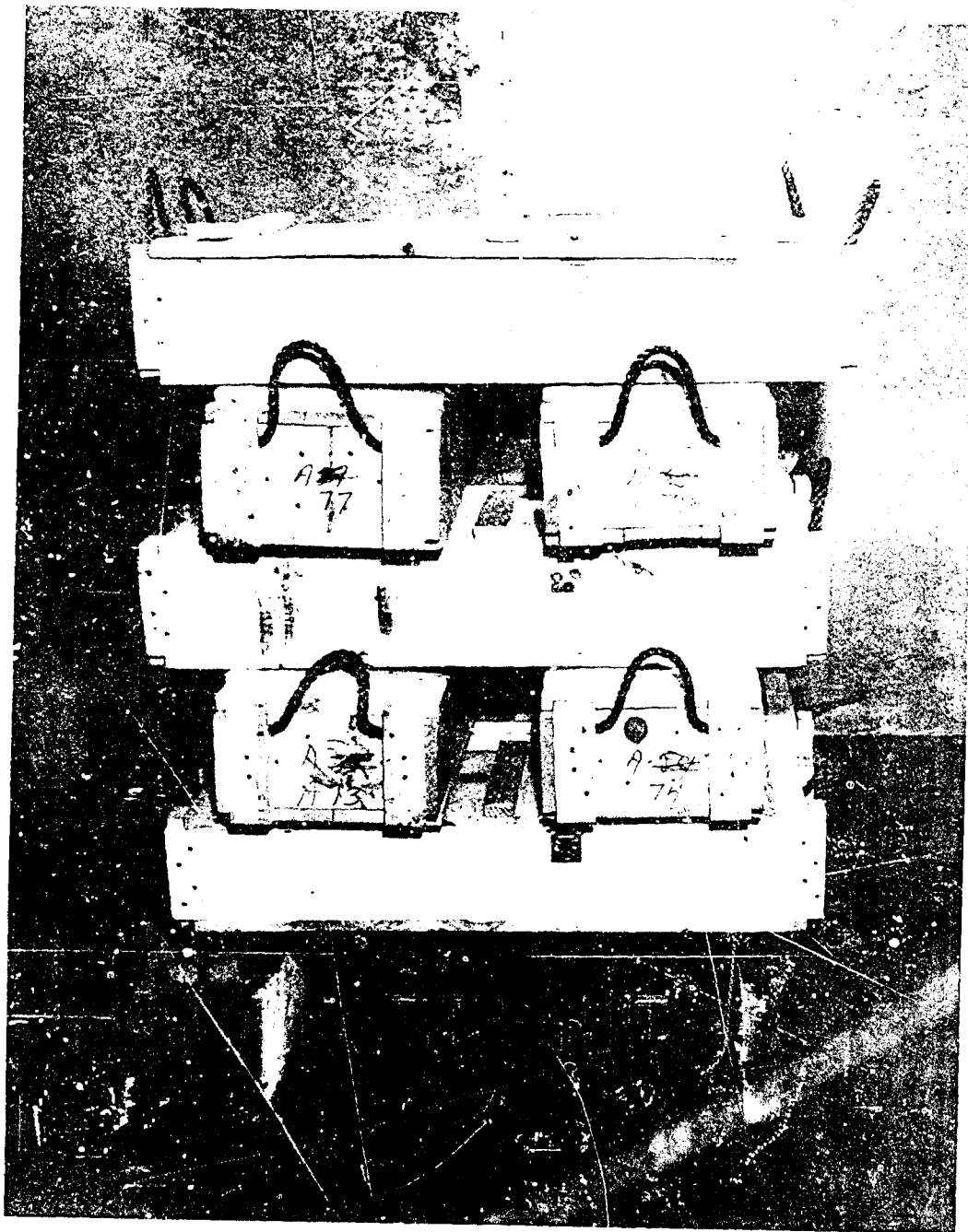


Figure 1. Stack of Boxes Positioned for Burning Test

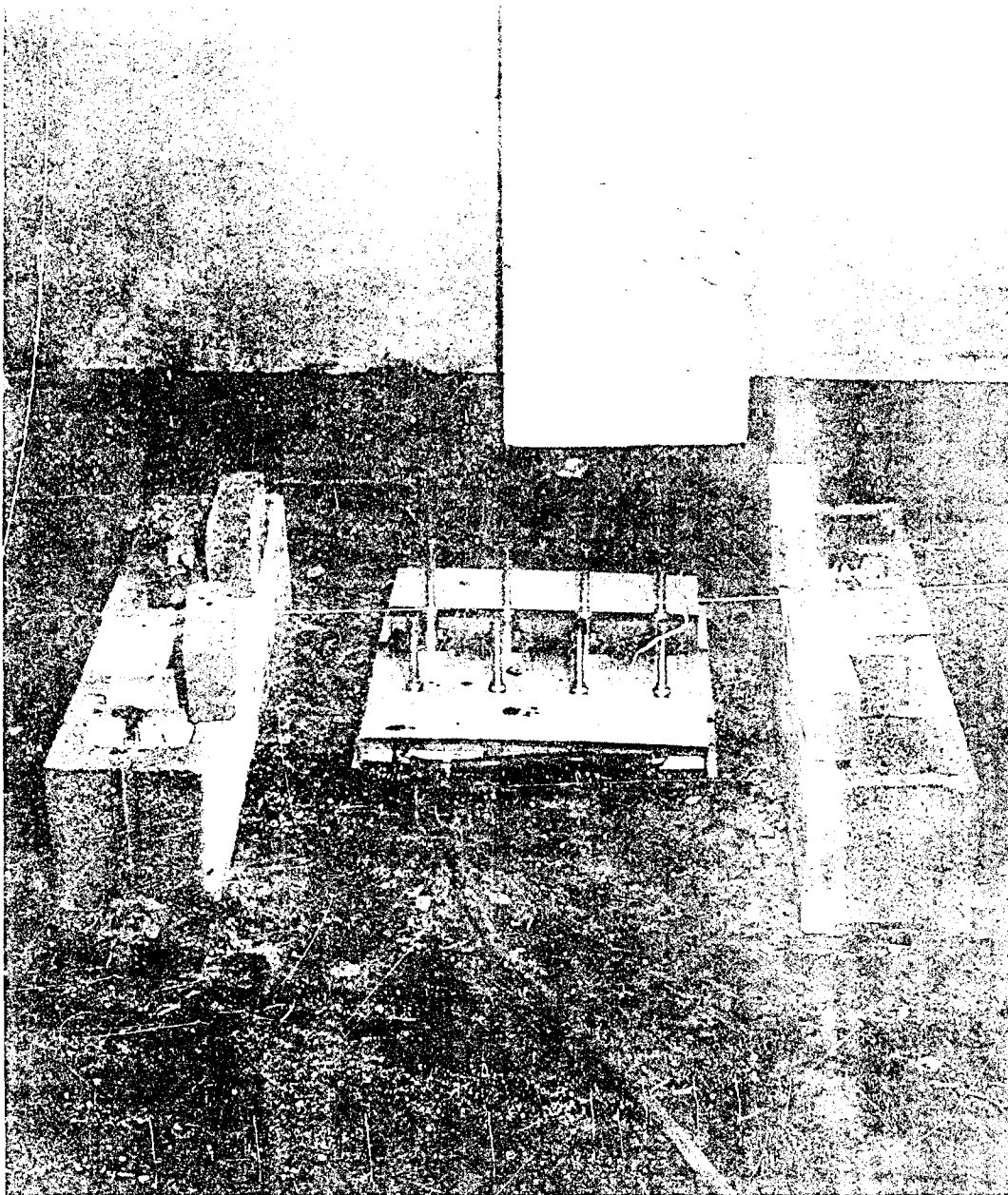


Figure 2. Eight-Burner Assembly Used as Ignition Source.

No. 3-962P) conforming to Federal Specification GG-B-817. The burners were arranged in two parallel rows of four each with center lines 8 inches apart. The burners were tied into a manifold and fed with propane at a rate of 6.5 liters per minute; the burner nozzles were kept wide open and the collars for controlling the air supply adjusted so that only the very tip of the flame was yellow. The flow of gas was timed and controlled from outside the shelter by a cock in the line connecting the manifold and the regulated propane tank. Before being ignited, the ignition source was placed centrally under the stack of boxes with the top of the burners 1-3/8 inches below the bottom of the stack and 1 inch in from the inner edges of the bottom boxes.

C. Shelters.

Two shelters were provided to reduce the effects of wind on both the steadiness of the ignition flame and burning conditions. As shown in figure 3, the shelters were 15 feet apart and were similarly oriented, facing 53° from true north. The shelters were 12 by 12 by 8 feet and constructed of sheet metal supported by 2- by 4-inch wood framing. Doors were provided for entry and egress, and heat-resistant-glass windows for the motion-picture cameras used to record the action within the shelter. During the first test in this series, it was found that wind eddies within the shelter disturbed the ignition flame. To reduce this disturbance in subsequent tests, transite baffles were used on three sides around the base of each stack; the fourth side was left open so as not to obstruct the view of the camera.

Essentially, the test procedure employed preparatory to and during field testing involved the following steps:

Step 1. Test boxes were serialized with a code letter (prefix) to designate the box type and sequential numbering. Boxes to be conditioned prior to field testing were subjected to steps 2, 3, and 4, below. Those to be tested, in the "as-received" condition (i.e., without any pretest conditioning) were directly subjected to step 5.

Step 2. Each box in the group to be conditioned was weighed to the nearest 5 grams and its moisture content determined by two separate readings with a moisture meter (Weston Moisture Meter, Model 8009, Type A, Weston Electrical Instrument Corp., Newark, New Jersey). Where the two readings from one box differed widely, two additional moisture determinations were made on the same unit.

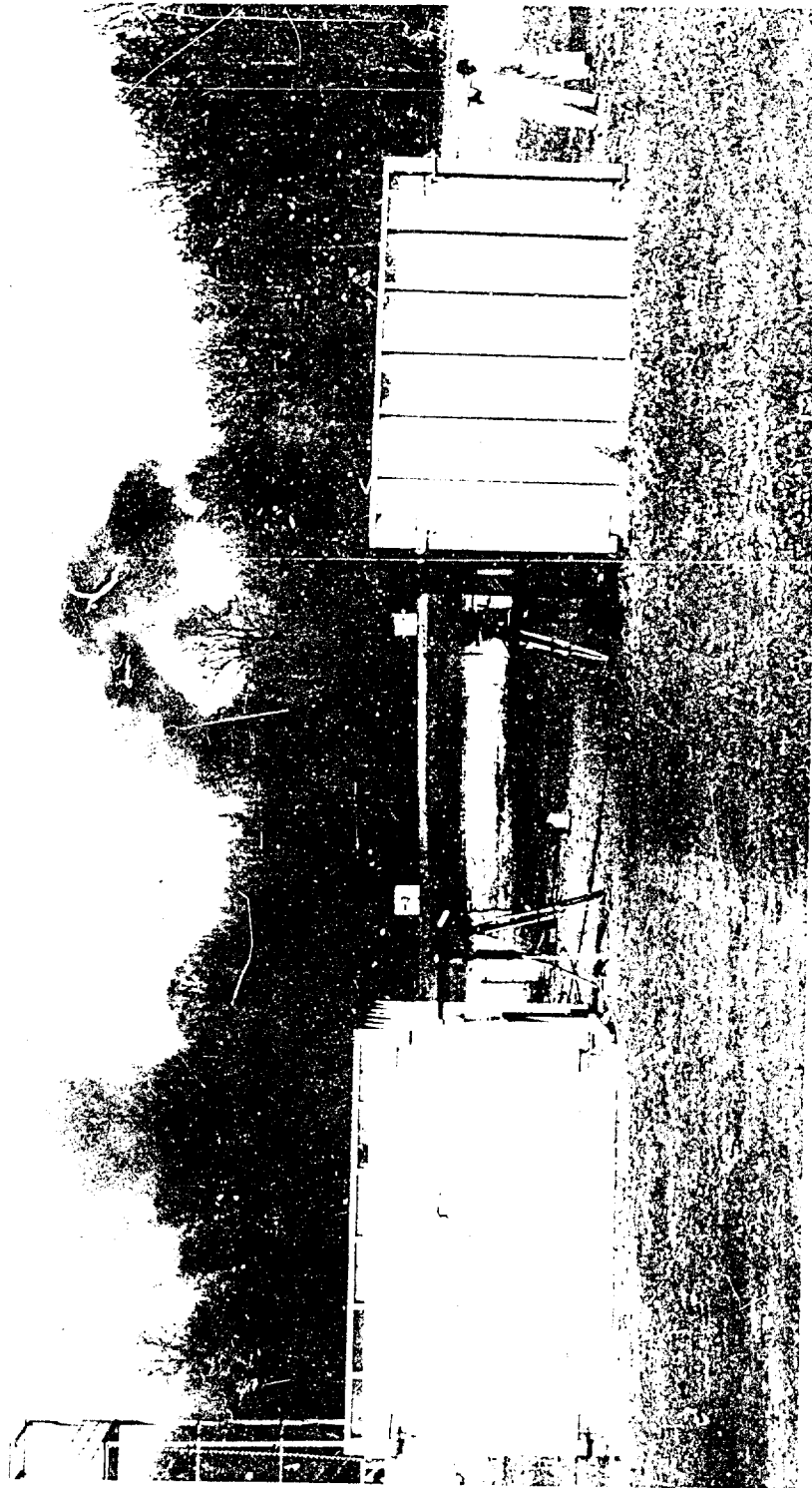


Figure 3. Twin Wind Shelter Used for Burning Test

Step 3. Designated boxes were conditioned, such as adjusting moisture content, dipping in a preservative solution, or coating with a paint.

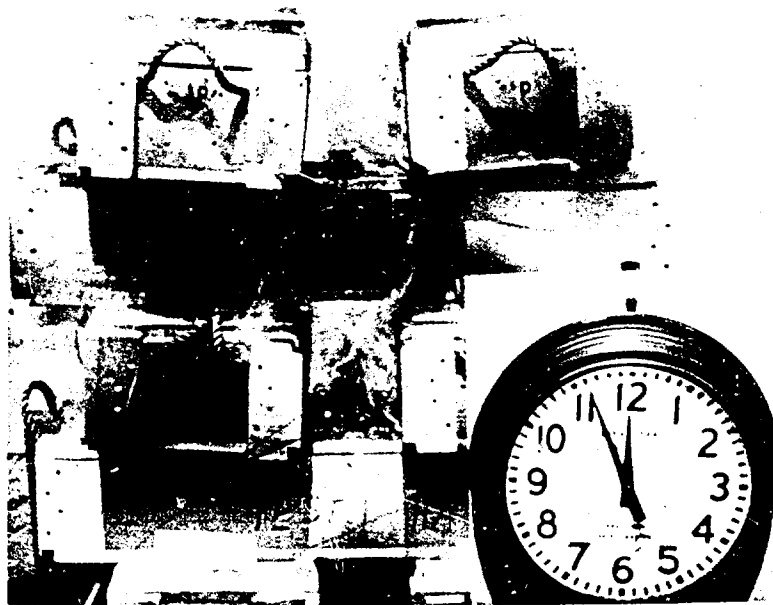
Step 4. As soon as practicable after step 3, the weight of each box was redetermined. (In some instances, this step was omitted since it provided no useful information over that which could be derived from step 5.)

Step 5. Immediately before instituting step 6, below, the weight and moisture content of boxes were determined in the manner described in step 2, above. In addition, from each odd-numbered box, a sample (circular segment) of wood weighing between 100 to 130 grams was cut from the lid. The samples were forwarded to the laboratory for estimation of solvent content or of moisture content when the value was too low to be read by the meter.

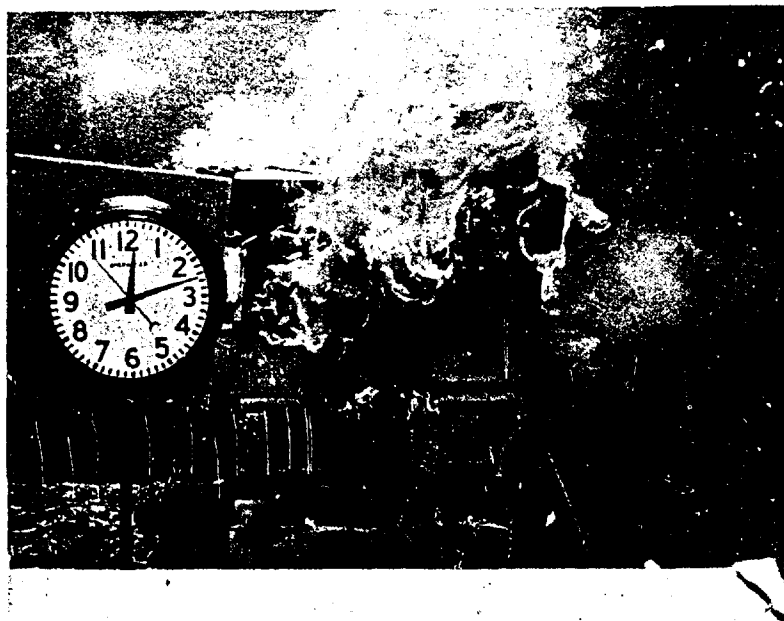
Step 6. Ten boxes, constituting a single test group, were set up over the ignition source in a shelter in the described stack configuration. The boxes, constituting the group with which the first was to be compared, were similarly set up in the other shelter.

Step 7. Simultaneously the ignition sources in both shelters were ignited and, with the propane flow controlled from outside the shelter, permitted to burn for exactly 2.0 minutes. (In trials 1 and 2, and in trials where conflagration was achieved in less than 2.0 minutes, the ignition time differed from that specified.) The activities within each shelter were monitored by test personnel with stop watches and photographically documented by motion pictures taken at 12 frames per second to reduce the reviewing time. The times from the start of flame application to the ignition of the different levels of boxes and to conflagration (i. e., the ignition of both boxes on the topmost level, figure 4) were determined. Where burning did not propagate after the removal of the ignition source, the time to the cessation of flame was recorded, again with time being taken from the start of flame application. Other data recorded included the ambient temperature and relative humidity and the prevailing windspeed and direction.

Step 8. The test was terminated when conflagration was achieved. If conflagration were not achieved, step 7 was repeated up to three additional times. If this failed to result in a conflagration, the boxes were then removed from the shelter for redetermination of weight and moisture content to provide some indication of any damage caused by the successive exposures to flame. (In several instances, instead of terminating the test after four ignition attempts, the boxes were restacked in reverse order, and step 7 was repeated.)



A. Condition of the stack at approximately the time it is considered in conflagration



B. The stack permitted to burn beyond the time recorded for state of conflagration

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Figure 4. Burning Boxes

III. DESCRIPTION OF BOXES.

The boxes used for the test were taken from regular production runs intended to comply with Military Specification for Boxes, Ammunition Packing; Wood, Nailed.⁵ The specific boxes are known as Box, Packing, Ammunition, for 105-mm Howitzer Ammunition in Fiber Container, M105A2. The inside dimensions are 32 by 10-3/8 by 5-1/4 inches and the approximate overall outside dimensions are 37-1/4 by 12 by 8 inches. As may be seen in figure 1, the boxes have hinge and hasp hardware, polypropylene rope handles, two exterior vertical cleats on each end, and three cover cleats. Also, the boxes have double-end construction.

Three groups of boxes were used for the burn tests. They are designated A, C, and F. A boxes are primarily of ponderosa pine; the shook had been dipped for 1 minute in the TT-W-572 preservative solution (pentachlorophenol type), and the boxes were fabricated by the Commander Box Co., Texarkana, Texas, in March 1969. C boxes are primarily of engelmann spruce; they were not given any preservative treatment by the supplier; they were fabricated by the Bennett Box Co., Texarkana, Texas, and the boxes are stamped as fabricated in April 1969. F boxes are primarily of southern yellow pine; the boxes had been immersed for about 1 minute in the TT-W-572 preservative solution (pentachlorophenol type); the boxes were fabricated by the Miller Box Co., Tuscaloosa, Alabama, and they were stamped as being fabricated in March 1969. Besides the primary wood species of construction, boards and cleats of other wood species were present in some of the boxes, especially in group C.

IV. RESULTS AND DISCUSSION.

The data for each burning test are given in appendix A: date and time; meteorological conditions; type of box; average weight and moisture content of the 10 boxes just prior to burning; number of ignition attempts; number of minutes for boxes at each level to start burning; and remarks where required.

In appendix B, for each test, are the weights of each individual box and moisture content prior to burning. Also listed are the weights of each box where changes may have been produced by any conditioning such as wetting, drying, application of preservative, or application of fire retardant. In a few of the tests where conflagration did not occur, weights of each box after burning are also shown.

The data generated by these tests were analyzed by two basic methods. The first was to compare the frequency of one type of box

being found less flammable than another during simultaneous testing. The second method was to compare the flammability ratings of the different types of boxes. This rating is defined as the reciprocal of time in minutes, multiplied by 100, required for the 10-box stack to be in conflagration; the higher the number, the more flammable the boxes. Associated with this rating is a negative parenthetical number which indicates the number of previous attempts to ignite the stack by the 2-minute application of flame from the ignition source. If conflagration were not achieved, the validity of the flammability rating is in doubt, since the rating can be biased by the number of attempts to ignite the stack. However, the rating does provide an inter-test evaluation, as compared to the direct comparison method which is dependent upon essentially concurrent testing of the box types under consideration.

A. As-Received Boxes.

1. Results.

Ten tests (No. 1, 2, 3, 4, 5, 6, 9, 10, 19, and 20) were run to compare the flammability of the boxes as they were received from the supplier.

The pertinent results of the 10 tests performed with stacks of as-received boxes are summarized in tables I and II. By use of the comparison method, it was found that the Code F (treated southern yellow pine) boxes were consistently less flammable than either the Code A (treated ponderosa pine) or Code C (untreated spruce) boxes, and that the Code A and Code C did not differ in flammability; i. e., instances of Code A boxes being less flammable than Code C boxes were equal to that of Code C boxes being less flammable than Code A boxes. The second method of analysis provided flammability ratings which also indicated that Code F boxes were the least flammable, and that Code A boxes were only slightly more flammable than the Code C.

As-received boxes were also used in tests (No. 7, 8, 17, 18, 21, 22, 23, 24, 26, 27, 30, 31, 32, 33, 34, 35, and 36) to compare these boxes with boxes conditioned in the manner described in subsequent section of this report. If the data obtained in these tests are pooled with the results presented in table II, the flammability ratings for as-received boxes, based on the total test effort, are as indicated in table III, and the same conclusions regarding the relative flammability of the three types of boxes tested remains the same.

2. Discussion.

Unfortunately, the untreated boxes, which were mainly constructed of spruce, were of a different wood than the treated boxes, and

Table I. Comparative Flammability of As-Received Boxes

Test number	Code ^{a/}	Conflagration time ^{b/} Trial number			Flammability rating	Flammable ^{a/}	
		1	2	3		More	Less
1	C A	X 18.0	min		<u>c/</u> <u>c/</u>	A	C
2	A C	4.7 3.0			<u>c/</u> <u>c/</u>	C	A
3	C F	X X	6.0 X	X	17(-1) 0(-2)	C	F
4	F C	X 4.5			0 22	C	F
5	A F	4.2 X	X	X	24 0(-2)	A	F
6	F A	X X	20.0 8.5		5(-1) 12(-1)	A	F
9	C A	3.8 X	X	3.0	26 33(-2)	C	A
10	A C	X X	3.0 6.0		33(-1) 17(-1)	A	C
19	A F	2.0 8.0			50 13	A	F
20	F A	X 2.5	4.5		22(-1) 40	A	F

^{a/} A = treated ponderosa pine; C = untreated engelmann spruce; and F = treated southern yellow pine.

^{b/} X denotes the flame self-extinguished after the withdrawal of the ignition source.

^{c/} In tests 1 and 2, the ignition source was applied for 5.0 minutes instead of 2.0 minutes as in all subsequent tests. Therefore, the data were not used in obtaining flammability ratings.

Table II. Flammability Rating in Tests for As-Received Boxes

Box types	Number of tests	Average rating
Shook-treated ponderosa pine (Code A)	6	32 (-0.5)
Untreated spruce (Code C)	4	21 (-0.5)
Box-treated southern yellow pine (Code F)	6	7 (-1.0)

Table III. Flammability Rating for As-Received Boxes in All Tests

Box type	Number of tests	Average rating
Shook-treated ponderosa pine (Code A)	13	38 (-0.3)
Untreated spruce (Code C)	10	21 (-0.5)
Box-treated southern yellow pine (Code F)	10	6 (-1.1)

so a direct comparison for flammability could not be made of preservative-treated and untreated boxes of the same wood species. As the treatment did not appear to have any effect on flammability, it was possible to compare this characteristic of the three types of wood used to construct the boxes. As shown by the results of table III, the boxes made of southern yellow pine were considerably less flammable than those made of either ponderosa pine or engelmann spruce. Based on the average weights of the boxes (9.08 kg for A; 9.57 kg for C; and 11.99 kg for F), the ratios of specific gravities of the southern yellow pine to spruce to ponderosa pine were 1.32:1.05:1.00. Recently, the

ponderosa pine has been favored for packing boxes over the southern yellow pine because of its weight saving advantage. The flammability of the boxes is in the inverse order to the specific gravities; i. e., the ponderosa pine being slightly more flammable than the spruce and considerably more flammable than the southern yellow pine. The same relationship between specific gravity and flammability has been determined¹¹ by fire-tube tests for 17 wood species as shown in figure 5. Denser southern yellow pine may possess additional fire-retarding properties beyond that due to specific gravity as the point in figure 5, for the southern yellow pine, is well below the points of the other denser wood species. Apparently, the increase in flammability for less dense wood also holds for various specific gravities of the same wood species, as is shown in figure 6, where fire-tube results¹² are plotted against specific gravity for southern yellow pine.

B. Effects of Moisture Content.

1. Results.

Boxes were conditioned under moist and dry environments preparatory to burning tests for rating and comparing the flammability of the three types of boxes at different moisture contents. To increase the moisture content, the boxes were conditioned by being water sprayed hourly and then stored overnight (i. e., until test time) to achieve equilibrium in a chamber maintained at 113°F and 85 percent RH. To reduce the moisture content, the boxes were stored at least 1 day in a low-humidity chamber maintained at 155°F. When stacked for the burning trials, the boxes had reverted to ambient temperature.

The results of the burning trials are shown in table IV and are summarized in table V.

2. Discussion.

The well-known effects of water content upon the flammability of wood were markedly demonstrated in the burning test of the ammunition packing boxes. Boxes that contained over 18 percent moisture were difficult to ignite and burned comparatively slowly. These boxes apparently resisted ignition until the heat source effectively reduced the moisture content in the vicinity of the flame, after which the spread of burning was progressively more rapid. However, boxes with less than 6 percent moisture were readily ignited and the stack was quickly engulfed in flames. Data from fire-tube tests¹³ of southern yellow pine demonstrating the moisture-burning relationship are shown in figure 7.

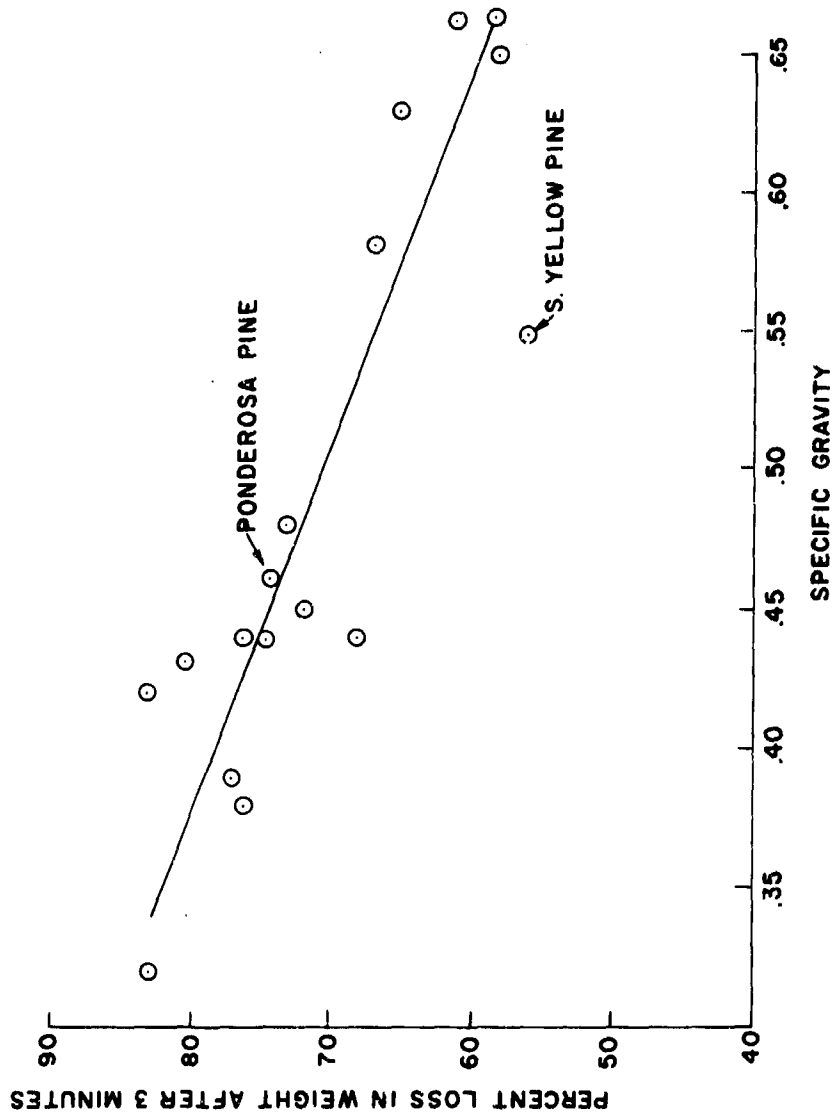


Figure 5. Effect of Specific Gravity in Fire-Tube Tests of Various Species of Untreated Wood

Data from McNaughton, G. C., and VanKleeck, A. Fire Test Methods Used in Research at the Forest Products Laboratory, Forest Products Laboratory, Madison, Wisconsin. No. R1443, Table 3 (January 1944).

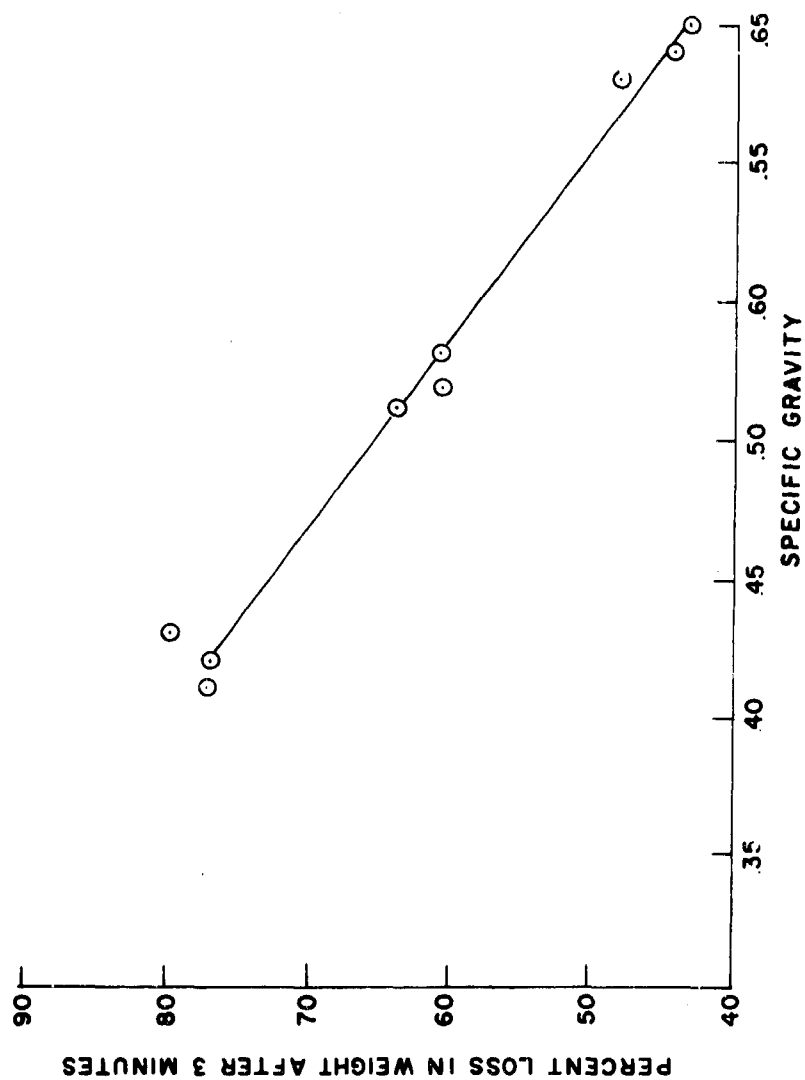


Figure 6. Effect of Specific Gravity in Fire-Tube Tests of Untreated Southern Yellow Pine Wood

Data from McNaughton, G.C., and VanKleeck, A. Fire Test Methods Used in Research at the Forest Products Laboratory, Forest Products Laboratory, Madison, Wisconsin. No. R1443, Table 2 (January 1944).

Table IV. Comparative Flammability of Moist and Dry Boxes

Test number.	Code ^{a/}	Moisture content	Conflagration time ^{b/}				Flammability rating
			Trial number				
			1	2	3	4	
		%	min				
11	A	17.4	X	7.5			13(-1)
	F	21.9	X	X	X		0(-2)
12	F	23.5	X	X	X	X	0(-3)
	C	20.8	X	X	X	X	0(-3)
13	C	20.5	X	X	X	X	0(-3)
	A	19.3	X	X	X	12.1	8(-3)
14	F	4.3	2.0				50
	C	3.4	1.0				100
15	A	2.1	1.3				77
	F	2.6	3.0				33
16	C	4.0	1.2				83
	A	2.5	1.3				77

^{a/} A = treated ponderosa pine; C = untreated engelmann spruce; and F = treated southern yellow pine.

^{b/} X denotes the flame self-extinguished after the withdrawal of the ignition source.

Table V. Summary of Flammability Ratings for Boxes at Three Conditions of Wetness^{a/}

Code ^{b/}	Ratings under condition		
	Moist	Ambient	Dry
A	11(-2.0)	38(-0.3)	77
C	0(-3.0)	21(-0.5)	92
F	0(-2.5)	6(-1.1)	42

^{a/} Moist and dry data from table IV with two trials for each type of box; ambient data from table III.

^{b/} A = treated ponderosa pine; C = untreated engelmann spruce; and F = treated southern yellow pine

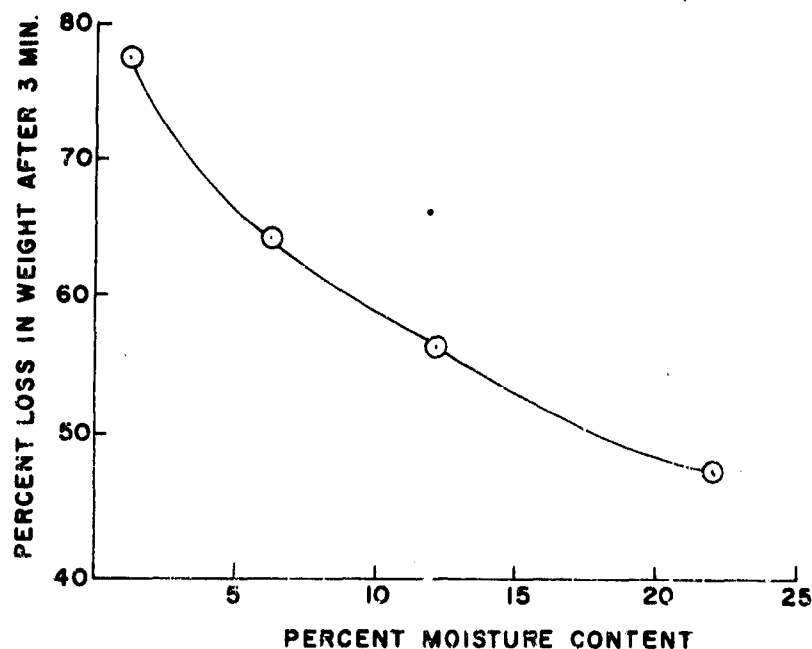


Figure 7. Effect of Moisture Content in Fire-Tube Tests of Southern Yellow Pine Wood

Data from McNaughton, G. C., and VanKleeck, A. Fire Test Methods Used in Research at the Forest Products Laboratory, Forest Products Laboratory, Madison, Wisconsin, No. R1443, Table 1 (January 1944).

The water-repellent part of the TT-W-572 preservative mixture keeps treated boxes drier when they are exposed to intermittent rain showers, as can be seen from figure 8, which shows the moisture content readings taken on boxes that were treated using solutions with, or without, a water repellent and then exposed for 20 months in Mississippi². Interior boxes of a pile tend to stay wetter than boxes of outside tiers. Lower moisture contents of the wood are also reflected in lighter-weight boxes. It does seem likely that, under some circumstances, water-repellent treated boxes would be more flammable than untreated boxes, stored under identical conditions, because of their lower-moisture content.

In climates that have distinct dry and rainy seasons, such as monsoon areas, the flammability of boxes would vary at different times of the year, the fire hazard being considerably greater during the dry season. The fire hazard of ammunition packing boxes stored in South Vietnam should be highest from January to March and be significantly reduced from May to December, with some variation depending upon the exact location. The driest month, rainiest months, and annual rainfall for an average year at various locations in South Vietnam are shown in figure 9.¹⁴

C. Effects of Residual-Preservative Solvent.

1. Results.

A number of tests were run with attempts made to insure the presence of residual solvent when the boxes were being ignited. This was accomplished by having the boxes dipped in preservative solutions locally, shortly before testing. The preconditioning treatments were varied in succeeding tests to exaggerate conditions and demonstrate more vividly the effects of residual solvent on the flammability of boxes.

In tests No. 7 and 8, Code C boxes were dipped in Woodlife* and permitted to air dry for 3 days before being comparatively tested with as-received Code C boxes. The preservative treatment was carried out by the Edgewood Arsenal Industrial Operations Division, following normal procedures for treating wooden packing boxes fabricated locally. The results of the burning trials, included in table VI, provided no positive indication of the solvent's contribution to flammability.

* Woodlife, Meeting Federal Specification TT-W-572, Type II, Composition A (pentachlorophenol, 4.2 percent; other chlorophenols, 0.8 percent; inerts 95 percent), product of US Plywood Division of Champion Paper Inc; New York.

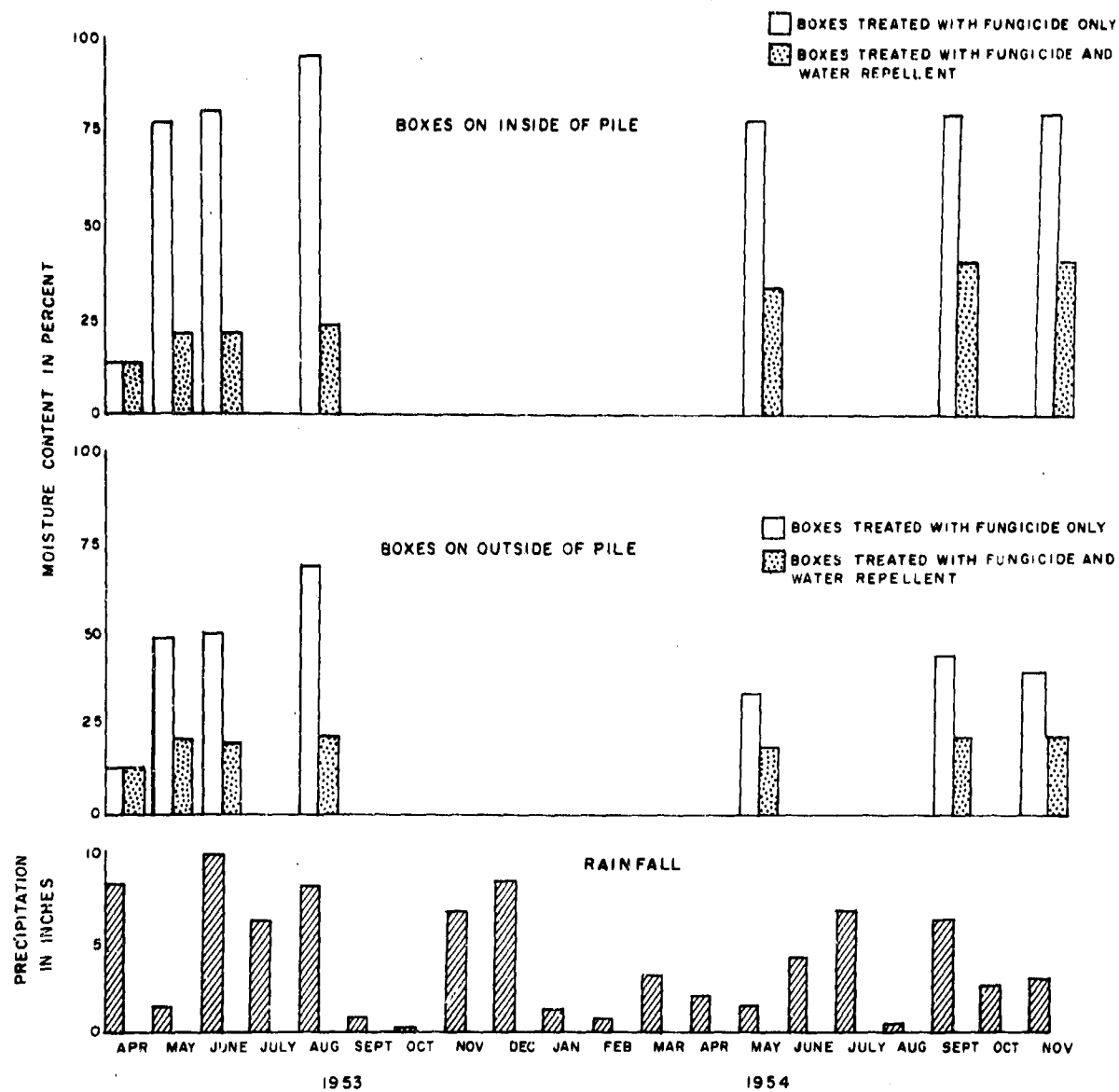


Figure 8. The Effectiveness of a Water Repellent Applied as a 3-Minute Dip in Preventing Wetting of M22 Boxes by Rainwater
Exposure was in Mississippi and the fungicide was pentachlorophenol.

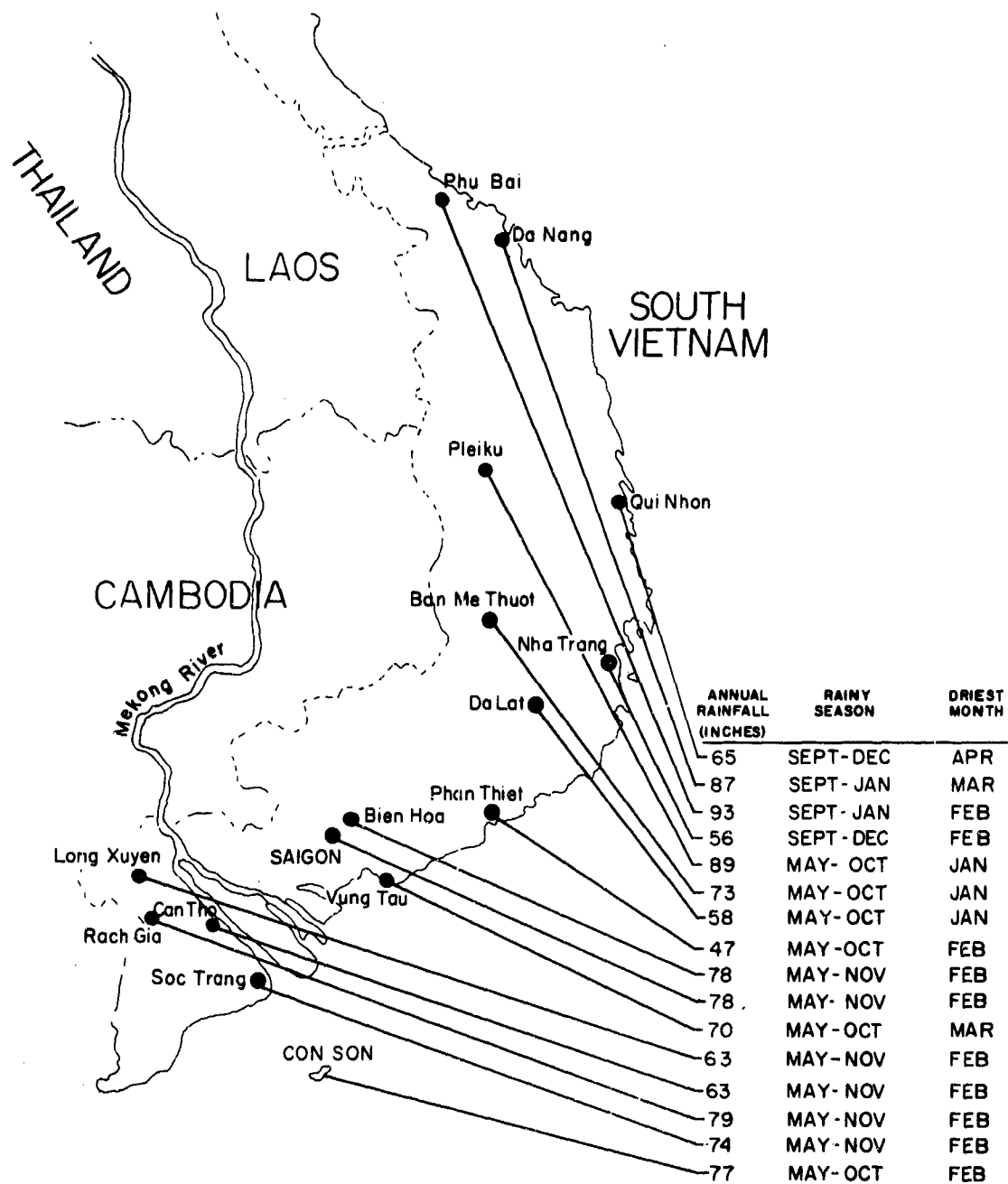


Figure 9. Rainy and Dry Periods at Various Locations in South Vietnam

Table VI. Comparative Flammability of Freshly-Treated Boxes

Test number	Code ^{a/}	Preconditioning	Conflagration time ^{b/}				Flammability rating
			Trial number				
			1	2	3	4	
			min				
7	C	As-received	15.0				7
	C	Woodlife	X	X	X	2.3 ^{c/}	43(-3)
8	C	Woodlife	2.1				48
	C	As-received	X	X	14.5		7(-2)
17	A	As-received	7.0				14
	C	Woodlife	3.3				30
18	C	Woodlife (unventilated)	1.8				56
	A	As-received	2.0				50
24	C	Woodtox	3.4				29
	C	As-received	X	2.9			34(-1)
25	C	Woodlife	2.2				45
	C	Woodtox	2.6				38
26	C	As-received	2.9				34
	C	Woodtox	3.0				33
33	A	As-received	1.8				56
	F	Woodlife	X	3.5			29(-1)
34	F	Woodlife	4.1				24
	A	As-received	2.3				43
35	F	As-received	X	X	X	X ^{d/}	0(-3)
	F	Woodtox	X	X	X	X ^{d/}	0(-3)
36	F	Woodtox	X	X	X	X	0(-3)
	F	As-received	X	14.3			6(-1)

^{a/} A = treated ponderosa pine; C = untreated engelmann spruce; and F = treated southern yellow pine.

^{b/} X denotes the flame self-extinguished after the withdrawal of the ignition source.

^{c/} For this trial, boxes were rearranged, revising their order on the test stack. Thus, an alternate flammability rating for this condition is 0(-2).

^{d/} The order of the boxes in the stack were reversed on the following day, and both stacks burned after two additional ignition attempts.

To expedite testing and to provide the utmost control over the dip treatment of boxes, test personnel of Field Evaluation Division performed this operation for all tests subsequent to tests No. 7 and 8 requiring this preconditioning. In all instances, the boxes were completely immersed in the treating solution for 3.0 minutes.

In tests No. 17 and 18, Code C boxes dipped in Woodlife were removed to an unventilated chamber while still wet with preservative solution and stored there for 2 days. These boxes were comparatively tested with as-received Code A boxes shortly after being removed from the chamber. The freshly-dipped Code C boxes were found to be only slightly more flammable than the as-received Code A boxes. The difference in average flammability ratings of 43 and 32 is not considered to have any practical significance.

Since boxes preconditioned with Woodlife showed no particular difference in flammability because of residual solvent, additional tests were run to determine whether similar results would be obtained with another commercial preservative solution, Woodtox. * Distillation ranges of the solvents in the two preservative solutions are shown in figure 10. In tests No. 24, 25, 26, 33, 34, 35, and 36 boxes treated with Woodlife were comparatively tested with as-received boxes or boxes conditioned with Woodtox. The results of this effort are also included in table VI. Again, the tests produced no evidence of any meaningful difference in the flammability of preservative-treated and untreated wood boxes.

2. Discussion.

Although there were no indications of the preservative treatment appreciably increasing the flammability of packing boxes for ammunition, the presence of large amounts of residual solvent could present a fire hazard. In laboratory tests that used sticks of wood immersed for 3 minutes in the wood-preservative, water-repellent solution, the wood was easily ignited because of residual solvent when the solvent was allowed to evaporate for only a short time. Typical data are presented in table VII, which shows the maximum amount of time the wood could be held in a flame and be self-extinguishing upon removal from the flame. The treated wood was more easily ignited after 13 hours of heating than the untreated wood, but this was due to moisture driven off during the oven drying.

* Woodtox - Water Repellent and Wood Preservative No. 140 - Ready to Use, Meeting Federal Specification TT-W-572 (pentachlorophenol 4.5 percent; related compounds 0.5 percent; mineral spirits 85.05 percent; inert 9.95 percent; product of Wood Treating Chemical Co., St. Louis, Mo.

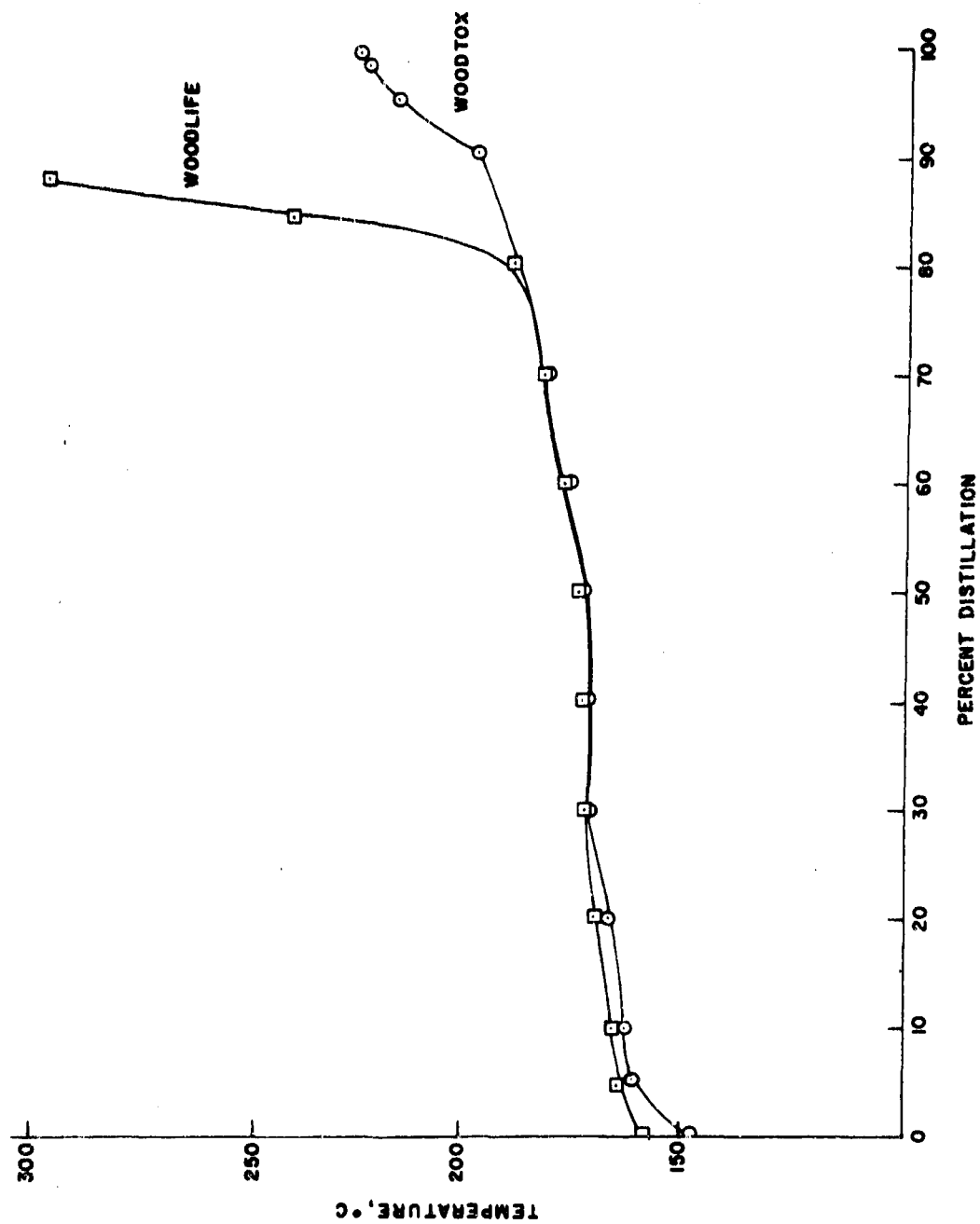


Figure 10. Distillation Ranges (ASTM D1078-63) for Solvent
 Fraction of Preservative-Treating Solutions Used for
 Dipping Boxes Before Burn Test

Table VII. Flame Exposure Time for Preservative-Treated Wood
(6 by 1 by 1 inch) Samples to Achieve Sustained Burning

Drying time at 60°C	Flame time
hours	sec
0.25	< 0.5
0.50	< 0.5
2.50	2.0 - 2.5
13.0	3.0
Untreated wood	4.25

Most of the solvent evaporates during the early drying period, but then the evaporation rate decreases. Higher temperatures increase the evaporation rate. Some typical solvent evaporation rates are shown in figure 11 for preservative-treated wooden sticks that were placed in well ventilated locations after treatment.

The boxes that had been preservative treated by suppliers, groups A and F, appeared to be free of residual solvent when received; i. e., the oil soluble dye test ("Penta-tration") in section 4.4.6 of Military Specifications MIL-B-2427D⁵ did not give any indications that residual solvent was present. The tests of freshly-dipped C boxes were inconclusive as to the effects of residual solvent on burning, and there were no indications of pronounced changes in either ease of ignition or burning rates because of the solvent that would be retained by the boxes.

Attempts were made during the test to determine the amounts of solvent still retained by the wood at the time of the burning. The pieces of lids that were removed from the boxes just prior to the burning test were sealed in mylar-polyethylene bags and forwarded to the laboratory. A sample of 25 to 50 grams of wood, made up of pieces from the five lids of a burning test, was subjected to a vacuum distillation, and the distillate, mostly water, was collected in cold traps. The volatile organic portion of the distillate was extracted with methylene chloride and a fraction injected into a gas chromatograph. The area under the peaks was used as a quantitative measure of the amount of organic volatiles present, based on a chromatogram

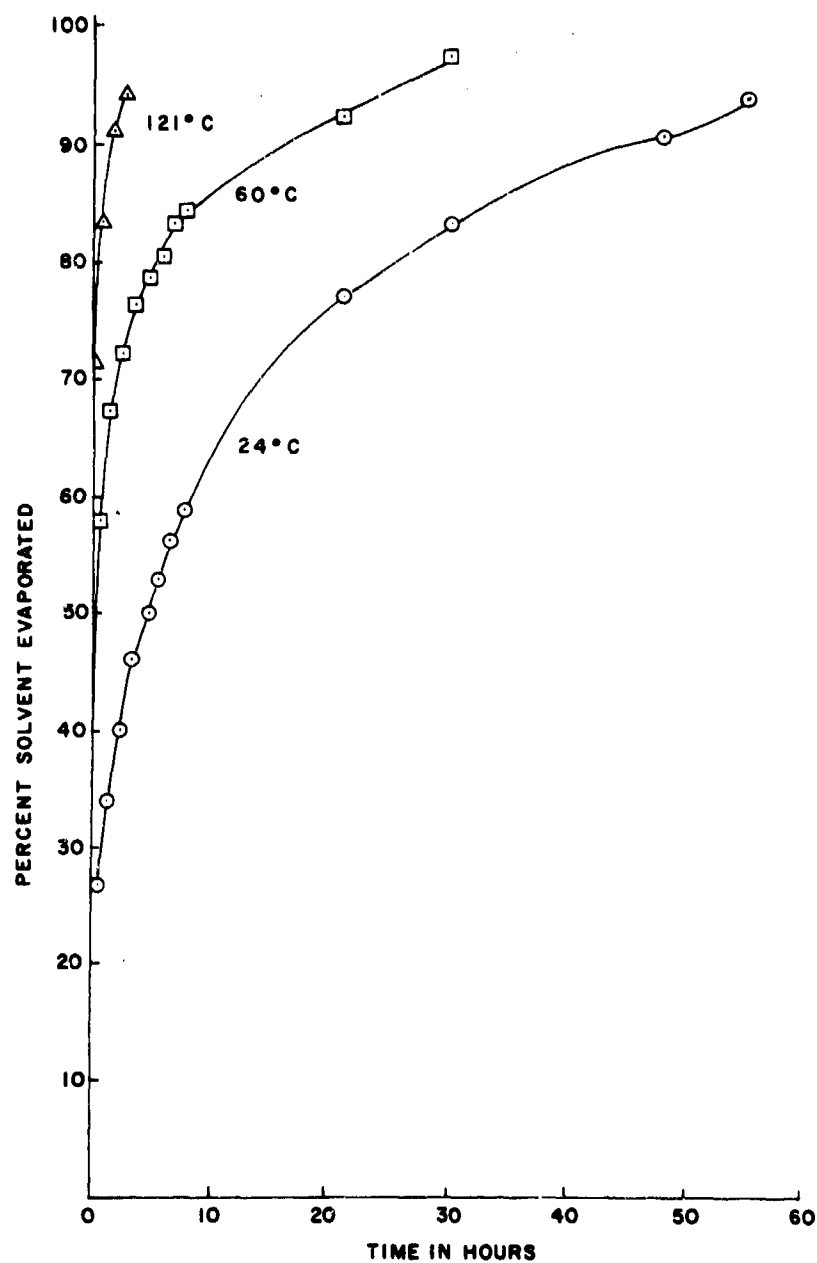


Figure 11. Rate of Evaporation of Solvent From Wood Treated With Preservative Water-Repellent Solution

of a known amount of the solvent that is used in the preservative solution.* The results are shown in table VIII. The analytical method determined residual solvent and the very volatile fractions normally present in the wood. The volatile ingredients of wood are also inflammable and would contribute to a fire.

Only pieces of lids were used for the analysis, as the pieces cut out did not contain any exposed end grain, only minimal absorption of solvent could be expected. Therefore, the amounts of solvent determined by analysis are much lower than the amounts determined by weight, which include the entire box with its various exposed end-grain surfaces.

The highest amounts of organic volatiles distilled from the wood were obtained from the untreated spruce. The dip-treated wood, except for the sample with highest pickups, retained less volatile fractions. It appears that the treating solution dissolves out some of the volatile portions of the wood. This is to be expected, as one of the methods¹⁵ for analyzing for oils, etc., in wood is an extraction method using a solvent, such as petroleum ether. As-received F boxes, which had been treated by the manufacturer, had extremely low volatile organic contents. Dip-treating these boxes for this test did increase the retained volatiles, and the flammability of the retreated F boxes consequently increased. None of the A boxes were redipped. It does appear, therefore, that the flammability of wooden boxes is dependent upon the total amount of volatile organic materials that are present; that the solvent temporarily contributes to the fire hazard sufficient evaporation occurs; and that the treatment tends to extract some of the naturally occurring organic volatiles, thereby, decreasing flammability after the solvent has evaporated.

D. Effects of Fire-Retardant Additives.

Fire-retardant-treated wood is available,¹⁶ produced by impregnating water solutions of chemicals into wood under pressure. Brush, dip, or immersion treatments usually do not obtain the necessary retentions, but full-cell pressure treatments are generally used with dry salt retentions of at least 2-1/2 lb/cu ft and minimum penetrations 1/2 inch in depth.¹⁷ Most of the salts used to produce fire-retardant wood are water soluble and, therefore, are leached when exposed to rainfall. Gooch and coworkers⁸ had shown that triaryl phosphates, in conjunction with the pentachlorophenol, were an effective fire-retarding treatment for wood trestles treated with oil-type preservatives. With this as a basis, a few burning tests

* See appendix C for details of method.

Table VIII. Residual Solvent and Very Volatile Natural Constituents of Wood Samples From Boxes

Type of box ^{a/}	From box weights ^{b/}		By analysis of lid sample Total volatiles	Flammability rating	Burn test number
	Solvent pickup	Residual solvent			
	%	%	%		
C	Not dip-treated		0.69	33	26-1
C	Not dip-treated		0.72	40(-1)	24-2
C	2.5	1.5	0.48	38	25-2
C	4.4	2.9	0.69	31	24-1
C	3.3	1.9	0.16	46	25-1
C	3.9	1.9	0.15	35	26-2
F	Not dip-treated		0.05	—	No. F-25 ^{c/}
F	Not dip-treated		0.02	—	No. F-31 ^{c/}
F	Not dip-treated		0.05	0(-3)	35-1
F	Not dip-treated		0.07	0(-3)	36-2
F	1.9	0.9	0.28	29(-1)	33-2
F	1.8	0.7	0.29	25	34-i
F	2.2	0.6	0.48	0(-3)	35-2
F	2.1	d/	0.22	6(-1)	36-1
A	Not dip-treated		0.32	50	32-2
A	Not dip-treated		0.28	55	33-1

^{a/} A = treated ponderosa pine; C = untreated engelmann spruce; and F = treated southern yellow pine.

^{b/} Corrected for nonvolatile portion of treating solutions.

^{c/} Single boxes; not used for burning test.

^{d/} Not determined because of moisture change.

were performed to establish the feasibility of adding fire-retardant phosphates by a simple spray or dip procedure as a way of mitigating the flammability of wood in the form of packing boxes.

1. Results.

In test No. 23, the flammability of untreated spruce (Code C) boxes was compared with that of spruce boxes which had been sprayed with a mixture of approximately 30 percent TCP (tricresyl phosphates) in hexane and then permitted to air dry for 5 days. The flammability of Code C boxes dipped 3 minutes in Woodtox was compared with identical boxes dipped 3 minutes in a 25 percent (v/v) solution of TCP in Woodtox (25.8 percent TCP on a weight basis, by analysis); both treatments were applied 1 and 2 days before ignition was attempted in tests No. 27 and 28, respectively. In tests No. 29 and 30, the flammability of as-received treated southern yellow pine (Code F) boxes was compared to that of Code F boxes which had been sprayed 2 days earlier with a 50 percent (v/v) solution of TCP in perchloroethylene. Tests No. 31 and 32 were duplicates of the latter two, except that the basic box was the treated ponderosa pine (Code A) type. The results of these tests, given in table IX, indicate the ineffectiveness of the TCP as applied. Boxes dipped for 3 minutes in the preservative solution, containing 23.8 percent TCP were less flammable than those dipped in the same preservative solution less TCP, but the fire retardance was not sufficient to consider it an effective treatment.

2. Discussion.

The wet pickup of the preservative solution with added TCP was 3.7 percent, and the phosphorus content of the wood was, therefore, about 0.1 percent or only one-tenth the amount required for an effective treatment according to the studies of Gooch.⁸ Spraying solutions of 50 percent tricresyl phosphate, about double the concentration of the immersion, gave one-third the add-on of immersion and a phosphorus content of the wooden boxes of 0.07 percent.

As discussed in the next section, better results were obtained with fire-retardant paints. The fire-retardant paints contained about 25 percent polymeric phosphate, which is 32 percent phosphorus. When applied at the manufacturer's recommended rate of 100 sq ft/gal to the boxes, each having an outside surface of about 10 sq ft, produced a box with 0.4 percent phosphorus with all of the phosphorus in the exterior coating.

Table IX. Comparative Flammability of TCP-Treated Boxes

Test number	Code ^{a/}	Preconditioning	Conflagration time ^{b/}				Flammability rating
			Trial number				
			1	2	3	4	
			min				
23	C	As-received	4.9				20
	C	TCP and hexane spray	2.5				40
27	C	Woodtox dip	2.4				42
	C	Woodtox and TCP dip	X	2.7			37(-1)
28	C	Woodtox and TCP dip	X	3.3			30(-1)
	C	Woodtox dip	2.0				50
29	F	As-received	X	13.7			7(-1)
	F	TCP and Perchlor spray	X	X	14.0		7(-2)
30	F	TCP and Perchlor spray	16.7				6
	F	As-received	14.5				7
31	A	As-received	2.1				48
	A	TCP and Perchlor spray	8.7				11
32	A	TCP and Perchlor spray	2.6				38
	A	As-received	2.0				50

^{a/} A = treated ponderosa pine; C = untreated engelmann spruce; and F = treated southern yellow pine.

^{b/} X denotes the flame self-extinguished after the withdrawal of the ignition source.

E. Effects of Flame-Retardant Paints.

1. Results.

A number of commercial fire-retardant paints, two of which conformed to military specifications, were obtained and tested. These included the following:

a. Flame Shield, Series 76, Latex Type, Intumescent Fire Retardant Coating. M. A. Bruder & Sons, Inc., Philadelphia, Pa. (used in test No. 21).

b. Flame Shield, Series 38, Solvent Type, Intumescent Fire Retardant Coating. M. A. Bruder & Sons, Inc., Philadelphia, Pa. (used in test No. 22).

c. PC Fire Retardant Paint White (Emulsion Type) No. 2688 (with intumescent properties). The Martin Senour Co., Chicago, Ill. (used in tests No. 37, 38, 39, and 40).

d. Bru-tect II, Catalyzed Epoxy Coating, Part A (300 white and 306 green) and Part B (317 Catalyst). Bruning Paint Co., Inc., Baltimore, Md. (used in tests No. 37 and 38).

e. Fire Retardant Paint, MIL-P-52024B,¹⁸ Lot ODX34087, M. Buten & Sons, Inc., Philadelphia, Pa. (used in tests No. 41, 42, and 43).

f. Ocean Flame Retardant Paint No. 477, Flaymbar 2-Component Paint (Epoxy intumescent paint conforming to MIL -C-46081).¹⁹ Ocean Chemicals, Inc., Niagara Falls, N. Y. (used in test No. 44).

The above products were applied to boxes by roller and brush as a single or double coat. After the paint was considered dry, the burning trials were initiated. The results obtained are summarized in table X and discussed below.

In test No. 21, the latex-type flame shield was applied 7 days before the burning trials. The paint coverage on the 10 spruce boxes was approximately 100 sq ft/gal as recommended by the manufacturer. The coated boxes were tested concurrently with as-received spruce boxes that burned readily on the first trial. To ascertain that the shelter did not contribute to the observed difference in burning characteristics, the coated boxes were removed to the shelter, which

Table X. Comparative Flammability of Boxes Painted With Flame-Retardant Coatings

Test number	Code ^{a/}	Moisture	Preconditioning	Conflagration time ^{b/}				Flammability rating
				Trial number				
				1	2	3	4	
		%		min				
21	C	8.8	Flame Shield, latex type	X	X	X	X	0(-3)
	C	11.9	As-received	4.0				25
22	A	9.0	As-received	2.2				45
	A	8.4	Flame Shield, solvent type	X	36.5			3(-1)
37	A	<7	Flame-retardant paint (emulsion type)	X	X	X	X	0(-3)
	A	7.2	Bru-tect II	1.3				78
38	A	8.4	Bru-tect II	1.0				100
	A	<7	Flame-retardant paint (emulsion type)	X	X	X	X	0(-3)
39	C	7.9	Flame-retardant paint (emulsion type)	X	X	X	X	0(-3)
	A	14.9	Moistened	X	X	X	X	0(-3)
40	A	11.3	Moistened	10.3				10
	C	~7	Flame-retardant paint (emulsion type)	X	X	X	X	0(-3)
41	A	8.1	Two coats MIL-P-25024B paint	X	X	X	X	0(-3)
	F	16.4	Moistened	X	X	X	X	0(-3)
42	F	18.4	Moistened	X	X	15.3		7(-2)
	A	8.5	Two coats MIL-P-52024B paint	X	X	X	X	0(-3)
43	A	8.5	One coat MIL-P-52024B paint	2.1				48
	A	9.7	One coat MIL-P-52024B paint	2.2				45
44	C	9.4	One coat MIL-C-46081 paint	X	X	X	X	0(-3)
	C	8.6	Two coats MIL-C-46081 paint	X	X	X	X	0(-3)

^{a/} A = treated ponderosa pine; C = untreated engelmann spruce; and F = treated southern yellow pine.

^{b/} X denotes the flame self-extinguished after the withdrawal of the ignition source.

earlier held the untreated boxes, where they were set up in the reverse order. Four additional attempts failed to ignite the stack; the boxes were protected by the thermal barrier formed by the intumescent coating (figure 12).

Test No. 22 directly paralleled test No. 21 except for the use of the solvent-type flame shield and treated ponderosa pine (Code A) boxes. The flame-retardant properties of the solvent-type paint were considerably inferior to that of the latex intumescent paint.

In tests No. 37, 38, 39, and 40, an emulsion-type, intumescent, flame-retardant paint was used, which was believed to be very similar to the latex-type flame shield used in test No. 21 but formulated by a different manufacturer. The burning trials with this paint were performed 2 days after it was applied to untreated spruce and treated ponderosa pine boxes. To hasten the drying of the paint and at the same time increase the susceptibility of the wood to burning, the coated boxes were stored overnight at 155°F. Nevertheless, the boxes resisted burning and the flammability of the boxes in all tests was rated 0(-3). Subsequent to these trials, attempts were made to burn these boxes by increasing the heat source. It was found that the protection afforded by the intumescent paint could be defeated by (1) replacing the bottom two boxes of the stack with more flammable boxes capable of being ignited by the test ignition source, and (2) placing and igniting 50 grams or more of napalm between the bottom and second level of boxes on the stack.

The epoxy paint, Bru-tect II, against which the intumescent paint was compared in tests No. 37 and 38 was not purported to be flame retardant to a substrate but to be itself flame resistant. The epoxy-coated boxes that had been dried overnight at 155°F burned as rapidly as unpainted dry boxes. The moistened boxes against which the intumescent paint was compared in tests No. 39 and 40 fared considerably better than did the nonfire-retardant epoxy-painted boxes.

In tests No. 41, 42, and 43, the efficacy of MIL-P-52024B¹⁸ flame-retardant paint was investigated. In the first two of these tests, the flammability rating of treated ponderosa pine boxes with two coats of this flame-retardant paint was compared with that of moistened treated southern yellow pine boxes. The coated boxes had the second coat applied 4 days after the first coat and was burn-tested 3 days later. The painted boxes were top rated at 0(-3), whereas the unpainted boxes with an average moisture content of about 17 percent had an average flammability rating of 3.5 (-2.5). As a result of the



Figure 12. Condition of Boxes Coated With Intumescent Latex Paint After Burning Test

[The two center boxes (No. 151 and 152) were the bottom boxes for trial 1, and the outer boxes (No. 159 and 160) were the bottom boxes, upon reversal of the pile, for trials 2, 3, 4, and 5].

successful performance of the double coat of MIL-P-52024B paint, test No. 43 was run with boxes to which a single coat of this paint was applied. The burning trials carried out 6 days after the boxes were painted indicated that the single coat with an average flammability rating of 47 was totally ineffective. Since this demonstrated the importance of paint thickness, painted-wood samples were forwarded to the laboratory where measurements were taken microscopically using a filar eyepiece and macroscopically using fine wire as a gage. The readings by both techniques were averaged. The average and standard deviation for the double coat was 2.7 mils and 0.6 mil, respectively, whereas the values for the single coat were 1.3 mils and 0.3 mils, respectively.

The final test was run with spruce boxes with one and two coats of MIL-C-4608120 epoxy-intumescent paint. The first coat was applied 6 days before the burning trials, and the double coated boxes received the second coat 5 days before the burning trials. Each coat was applied with an estimated coverage of 140 sq ft/gal. Stacks of single and double coated boxes were tested simultaneously. The test stacks resisted four attempts at ignition, both, thereby, earning the flammability rating of 0(-3). To gain as much information as possible from this test, the order of the boxes on each stack was reversed and the test was repeated, with virtually identical results being obtained. As in test No. 37 to 40, attempts were then made to defeat the protection afforded by this intumescent coating by increasing the intensity of the heat source. The bottom-level boxes of each stack were replaced by boxes known to be quite flammable; in this instant, boxes painted with Bru-tect II. The heat contributed by the flammable boxes caused boxes with one coat of MIL-C-46081 paint to achieve conflagration within 2 minutes, whereas, the double coated boxes resisted ignition on the first attempt but achieved conflagration in 7.8 minutes of the second attempt.

2. Discussion.

The three principal fire-retardant paint coatings tested as coatings on boxes were the intumescent latex, the intumescent epoxy, and the nonintumescent alkyd paint. Intumescent (heat-swelling) paints contain an ammonium based catalyst, usually a phosphate, a carbon source, and a blowing agent. The latex emulsion paint that was used in tests No. 37, 38, 39, and 40 had, according to the can label, the following composition:

Composition by Weight

	<u>Percent</u>
Titanium dioxide	7
Esters	2
Alcohols	2
Mineral spirits	2
Pentaerythritol	7
*Polymeric phosphate	25
Chlorinated paraffin	4
Melamine resin	7
Synthetic latex solids	11
Water	33

The paint contained ammonium polyphosphate as the catalyst, pentaerythritol as the source of carbon, and melamine and chlorinated paraffin as the blowing agents. A single coating was used for the boxes, but from the results of a laboratory crib test, which are shown in figure 13, two coats are far superior. The latex intumescent paint is recommended by the manufacturer only for interior surfaces, but sticks coated with paint and exposed for 50 hours in the weatherometer, operating with continuous simulated sunshine and 18 minutes of water spray each 2 hours, did not show a decrease in fire retardance when tested in the laboratory.

The nonintumescent paint, used in box-burning tests No. 41, 42, and 43, is intended for use on packing crates where fire retardance is needed, and the MIL-P-52024 specification¹⁸ requires a chlorinated dibasic acid-alkyd resin vehicle and antimony trioxide as part of the pigment. It was found, by analysis of the paint (see appendix D) that had been used for the burning test of the packing boxes, that the paint did not conform to the composition requirements of the specification, as it did not contain chlorendic acid in the vehicle, and antimony trioxide was absent from the pigment. The paint did, however, pass the fire-retardance test, having a burn index of 27, and the specification requirement is for a maximum of 48. A single coating of the paint, about 1.3 mils thick, did not confer any fire retardance to the painted boxes, but

* Polymeric nitrogenous phosphate

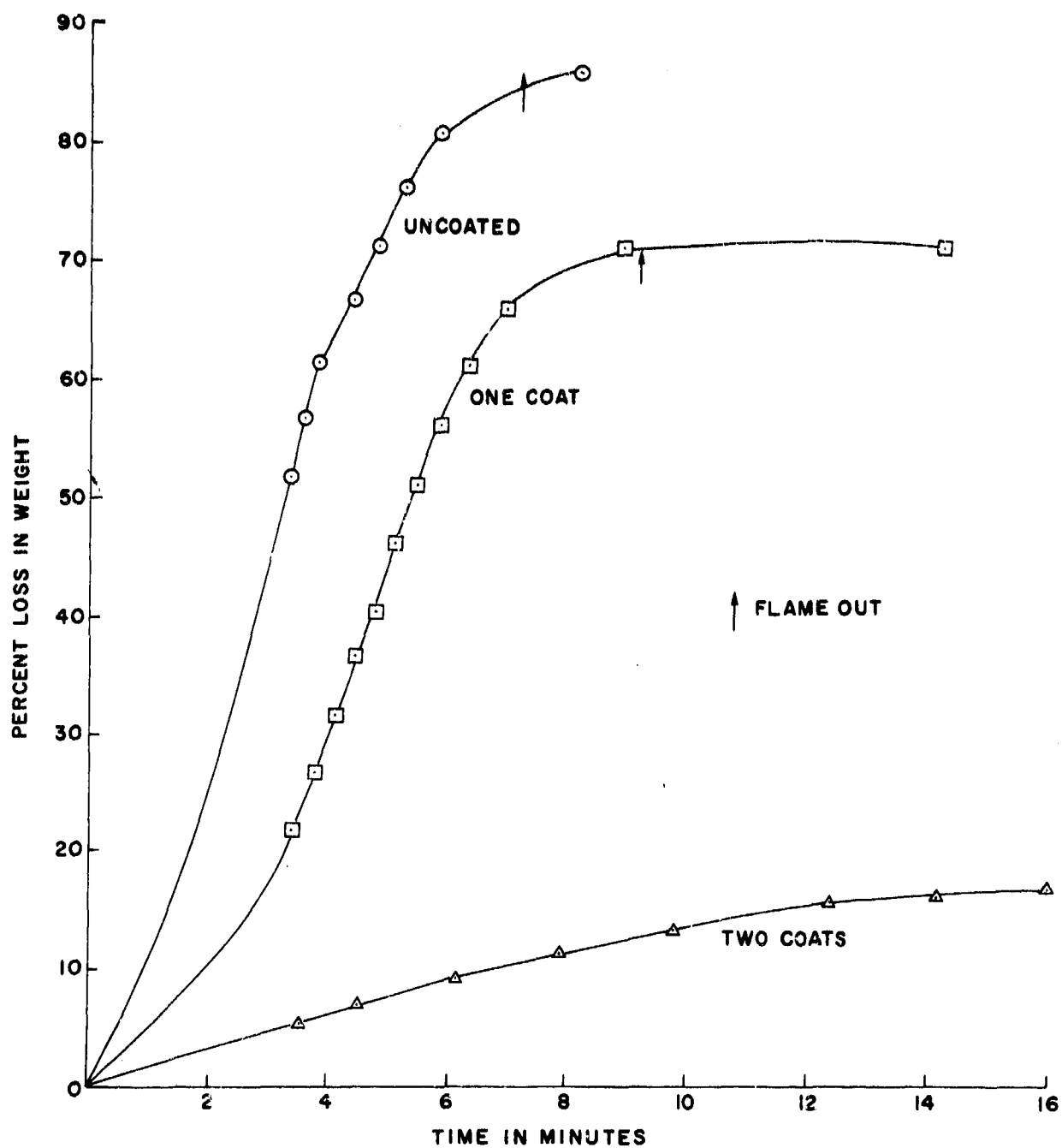


Figure 13. Fire-Crib Test of Ponderosa Pine Coated with Intumescent Latex Emulsion Paint (3-Minute Ignition Time).

two coats, about 2.7 mils, gave a marked reduction in fire hazard. The MIL-P-52024B paint should withstand outdoor exposure as the specification has requirements for 18 months' outdoor weathering and 72 hours' accelerated weathering.

A sample of paint, according to specification MIL-P-52024B, was obtained from another supplier, one whose product had been previously tested and found to comply, and this was tested, but in the laboratory only, and found to be superior in fire retardance to the sample that had been used on the boxes. The data obtained are shown in table XI.

The epoxy intumescent paint, although intended as an insulating coating¹⁹ for metals, gave excellent fire protection to the boxes when two coats were brushed on the exterior surface. The specification for the coating material, MIL-C-46081, has a requirement that coated-steel panels resist 336 hours of accelerated weathering. Laboratory tests, results of which are shown in table XI, indicate that one coat of the intumescent epoxy bestows fire retardance when applied to wood and two coats are superior to two coats of the MIL-P-52024B paint.

Table XI. Results of Laboratory Fire Tests of Painted Southern Yellow Pine^{a/}

Paint specifications	Number of coats	Ignition time ^{b/}	Weight loss after 3 minutes	Time to 50% weight loss	Residual weight
		min	%	min	%
Uncoated	—	0.25	33	4.0	9
MIL-P-52024B but not conforming to all requirements	2	0.50	3	8.9	5
MIL-P-52024B	2	1.0	1	—	99
MIL-P-52024B	2	1.75	1.5	16.3	28
MIL-C-46081	1	3.5	5	—	56
MIL-C-46081	2	4.0	0.5	—	97

^{a/} A crib of 12 sticks, each 6 inches by 5/8 by 5/8 inch, and a Fisher burner flame source were used.

^{b/} Flame was applied in repeated 15-second periods except for MIL-C-46081 coated samples (single-coated sample; ten, 15-second and one, 1-minute flaming periods; double-coated samples; eight, 15-second and one, 2-minute flaming periods).

V. CONCLUSIONS.

The water-repellent, wood-preservative treatment, specified in MIL-B-2427D, for application to wooden packing boxes used for ammunition, does not increase the flammability of the wood.

Boxes constructed of ponderosa pine constitute more of a fire hazard than boxes constructed of southern yellow pine.

The fire hazard of the packing boxes is dependent upon the moisture content of the wood, and the water repellent part of the treatment may keep the wood drier, lighter in weight, and somewhat more flammable when subject to intermittent rain showers.

Flammability of the boxes is also affected by the amount of organic volatiles present, including the solvent of the preservative solution until it finally evaporates, which occurs at a rate dependent upon the temperature and amount of ventilation; however, during the treating process, the solvent of the preservative solution extracts some of the naturally occurring volatiles in the wood, thus lowering the fire hazard.

The fire hazard of the preservative-treated packing boxes can be considerably reduced by applying an adequate thickness of fire-retardant paint coating to the exterior surfaces.

VI. RECOMMENDATIONS.

A. As an interim measure, the exterior surfaces of packing boxes should be coated with at least 3 mils of a paint complying with MIL-P-52024B, after the TT-W-572 preservative solution has been added and the solvent permitted to evaporate. Stenciling should be done after the paint has dried.

B. There should be developed a practical combined treatment that can be applied to packing boxes, or shook, and will afford both decay resistance and fire retardance.

LITERATURE CITED

1. Verrall, A. F. Decay Protection in Wooden Steps and Porches Through Proper Design and Protective Treatments. J. Forest Products Research Soc. 3, 54 (1953).
2. Verrall, A. F. Preservative Moisture-Repellent Treatments for Wooden Packing Boxes. Forest Products Journal 9, 3-24 (1959).
3. Verrall, A. F. Preservative Water-Repellent Treatments for Wire-Bound Veneer Boxes. US Department of Agriculture Forest Service, No. WP-3.30 (March 1959).
4. Verrall, A. F., and Scheffer, T. C. Preservative Treatments for Protecting Wood Boxes. US Department of Agriculture Forest Service, No. FPL 106 (April 1969).
5. Military Specification. MIL-B-2427D. Boxes, Ammunition Packing; Wood, Nailed. US Army Munitions Command, Dover, New Jersey. 28 May 1968.
6. Federal Specification. TT-W-572. Wood-Preservative; Water-Repellent. US Government Printing Office, Washington, D. C. 29 February 1952.
7. Bruce, H. D. Effects of Some Preservative Treatments on the Flammability of Wood. American Wood Preservers Assn., Annual Meeting. New Orleans, Louisiana. April 1956.
8. Gooch, R. M., Kenaga, D. L., and Tobey, H. M. Fire Retardants for Wood Treated With Oil-Type Preservatives. Forest Products Journal 9, 325 (1959).
9. Panek, E. Study of Paintability and Cleanliness of Wood Pressure Treated With Water-Repellent Preservative. American Wood Preservers Assn., Annual Meeting. New York, New York. April 1968.
10. McNaughton, G. C., and VanKleeck, A. Fire Test Methods Used in Research at the Forest Products Laboratory. Forest Products Laboratory, Madison, Wisconsin. No. R1443 (January 1944).

PRECEDING PAGE BLANK

11. Ibid, Table III.
12. Ibid, Table II.
13. Ibid, Table I.
14. US Naval Weather Service World-Wide Airfield Summaries. Volume 1. Southeast Asia. (June 1967).
15. Browning, B. L. In Wood Chemistry. p 1131. Edited by L. E. Wise and E. C. Jahn. Reinhold, New York. 1952.
16. Military Specification. MIL-L-19140C. Lumber and Plywood, Fire Retardant Treated. 12 November 1964.
17. Eickner, H. W. Fire-Retardant Treated Wood. Journal of Materials 1, 625 (September 1966).
18. Military Specifications. MIL-P-52024B(MR). Paint, Fire-Retardant, Olive Drab (for Wooden Crates). 28 June 1968.
19. Military Specifications. MIL-C-46081(MR). Coating Compound, Thermal Insulating (Intumescent). 15 May 1964.

APPENDIXES

Appendix		Page
A	Fire-Test Data: date and time of test; prevailing meteorological conditions; average moisture content of boxes; average weight of boxes; type of box; conditioning prior to fire test; residual solvent and volatiles content; duration of flame source; time for flame spread to reach each layer; time for conflagration; time to cessation of flame	51
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APPENDIX A

FIRE-TEST DATA

Test No.: 1 Date: 3/27/69 Time: 0920
 Average wind velocity, knots: 10 Wind direction, °: 320
 Maximum wind velocity, knots: 18 Air temperature, °F: 42
 Minimum wind velocity, knots: 3 Relative humidity, %: 40
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 13.5 Average weight, kg: 9.834
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>5.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u>5+*</u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 11.4 Average weight, kg: 9.343
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>5.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>18.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>4.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>16.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>17.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>18.0</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

* Precise time was not determined; however, all flame was extinguished by 6 min.

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Test No.: 2 Date: 3/27/69 Time: 1059
 Average wind velocity, knots: 6 Wind direction, °: 310
 Maximum wind velocity, knots: 14 Air temperature, °F: 45
 Minimum wind velocity, knots: 2 Relative humidity, %: 41
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 11.3 Average weight, kg: 9.384
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>4.7</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>4.7</u>			
Time to reach 2nd level, min:	<u>3.3</u>			
Time to reach 3rd level, min:	<u>4.0</u>			
Time to reach 4th level, min:	<u>4.5</u>			
Time to reach 5th level, min:	<u>4.7</u>			

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 12.5 Average weight, kg: 9.485
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>3.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>3.0</u>			
Time to reach 2nd level, min:	<u>2.2</u>			
Time to reach 3rd level, min:	<u>2.8</u>			
Time to reach 4th level, min:	<u>3.0</u>			
Time to reach 5th level, min:	<u>3.0</u>			

Remarks:

Appendix A

Test No.: 3 Date: 3/27/69 Time: 1308
 Average wind velocity, knots: 10 Wind direction, °: 290
 Maximum wind velocity, knots: 17 Air temperature, °F: 48
 Minimum wind velocity, knots: 4 Relative humidity, %: 36
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 13.8 Average weight, kg: 9.626
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>2.3</u>			
Time to conflagration, min:		<u>6.0</u>		
Time to reach 2nd level, min:		<u>3.5</u>		
Time to reach 3rd level, min:		<u>3.8</u>		
Time to reach 4th level, min:				
Time to reach 5th level, min:				

Shelter No. 2
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 12.1 Average weight, kg: 12.060
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	
Time to cessation of flame, min:	<u>2.0</u>	<u>2.0</u>	<u>4.8</u>	
Time to conflagration, min:				
Time to reach 2nd level, min:				
Time to reach 3rd level, min:				
Time to reach 4th level, min:				
Time to reach 5th level, min:				

Remarks:

Appendix A

Test No.: 4 Date: 3/27/69 Time 1607
 Average wind velocity, knots: 8 Wind direction, °: 300
 Maximum wind velocity, knots: 12 Air temperature, °F: 49
 Minimum wind velocity, knots: 2 Relative humidity, %: 32
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 11.9 Average weight, kg: 12.247
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:	<u>8.2*</u>			
Time to conflagration, min:				
Time to reach 2nd level, min:				
Time to reach 3rd level, min:				
Time to reach 4th level, min:				
Time to reach 5th level, min:				

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 13.0 Average weight, kg: 9.693
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>4.5</u>			
Time to reach 2nd level, min:	<u>1.3</u>			
Time to reach 3rd level, min:	<u>1.9</u>			
Time to reach 4th level, min:				
Time to reach 5th level, min:	<u>4.0</u>			

Remarks:

* Sap from 2nd level falling on a bottom box sustained burning; burning of the bottom box on which no sap fell ceased within 3.5 minutes.

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Test No.: 5 Date: 3/28/69 Time: 0900
 Average wind velocity, knots: 4 Wind direction, °: 240
 Maximum wind velocity, knots: 7 Air temperature, °F: 45
 Minimum wind velocity, knots: 1 Relative humidity, %: 39
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 10.8 Average weight, kg: 9.270
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>4.2</u>			
Time to reach 2nd level, min:	<u>1.0</u>			
Time to reach 3rd level, min:	<u>2.0</u>			
Time to reach 4th level, min:	<u>2.5</u>			
Time to reach 5th level, min:	<u>4.0</u>			

Shelter No. 2
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 12.7 Average weight, kg: 12.160
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	
Time to cessation of flame, min:	<u>4.4</u>	<u>3.4</u>	<u>4.0</u>	
Time to conflagration, min:				
Time to reach 2nd level, min:				
Time to reach 3rd level, min:				
Time to reach 4th level, min:				
Time to reach 5th level, min:				

Remarks:

Appendix A

Test No.: 6 Date: 3/28/69 Time 1112
 Average wind velocity, knots: 8 Wind direction, °: 200
 Maximum wind velocity, knots: 12 Air temperature, °F: 51
 Minimum wind velocity, knots: 1 Relative humidity, %: 34
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 10.6 Average weight, kg: 12.404
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>3.9</u>			
Time to conflagration, min:		<u>20.0</u>		
Time to reach 2nd level, min:		<u>2.0</u>		
Time to reach 3rd level, min:		<u>11.0</u>		
Time to reach 4th level, min:		<u>15.0</u>		
Time to reach 5th level, min:		<u>19.0</u>		

Shelter No. 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 10.4 Average weight, kg: 9.067
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>3.4</u>			
Time to conflagration, min:		<u>8.5</u>		
Time to reach 2nd level, min:	<u>1.0</u>	<u>1.8</u>		
Time to reach 3rd level, min:	<u>1.7</u>	<u>7.7</u>		
Time to reach 4th level, min:		<u>8.1</u>		
Time to reach 5th level, min:		<u>8.3</u>		

Remarks:

Test No.: 7 Date: 3/28/69 Time: 1520
 Average wind velocity, knots: 14 Wind direction, °: 190
 Maximum wind velocity, knots: 21 Air temperature, °F: 54
 Minimum wind velocity, knots: 2 Relative humidity, %: 29
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 13.0 Average weight, kg: 9.810
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>15.0</u>			
Time to reach 2nd level, min:	<u>1.3</u>			
Time to reach 3rd level, min:	<u>13.0</u>			
Time to reach 4th level, min:	<u>14.0</u>			
Time to reach 5th level, min:	<u>14.5</u>			

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Box-dipped in Woodlife (3/25) and air dried
 Average moisture content, %: 11.0 Average weight, kg: 9.428
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4 *
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>3.0</u>	<u>3.0</u>	<u>2.0</u>	
Time to conflagration, min:				<u>2.3</u>
Time to reach 2nd level, min:				<u>1.2</u>
Time to reach 3rd level, min:				
Time to reach 4th level, min:				
Time to reach 5th level, min:				

Remarks:

* For this trial, boxes were rearranged revising their order on the test stack.

Appendix A

Test No.: 8 Date: 3/28/69 Time: 1625
 Average wind velocity, knots: 11 Wind direction, °: 190
 Maximum wind velocity, knots: 19 Air temperature, °F: 53
 Minimum wind velocity, knots: 4 Relative humidity, %: 29
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Box-dipped in Woodlife (3/25) and air dried
 Average moisture content, %: 12.0 Average weight, kg: 9.538
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.1</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 13.1 Average weight, kg: 9.978
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u> </u>
Time to cessation of flame, min:	<u>2.4</u>	<u>2.7</u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u>14.5</u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u>3.0</u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u>8.0</u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u>13.0</u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u>14.5</u>	<u> </u>

Remarks:

Test No.: 9 Date: 3/29/69 Time: 0815
 Average wind velocity, knots: 10 Wind direction, °: 210
 Maximum wind velocity, knots: 17 Air temperature, °F: 51
 Minimum wind velocity, knots: 4 Relative humidity, %: 64
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 14.2 Average weight, kg: 9.792
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>3.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.2</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>2.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>3.2</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 10.3 Average weight, kg: 9.002
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u> </u>
Time to cessation of flame, min:	<u>3.8</u>	<u>2.3</u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u>3.0</u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u>1.5</u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u>1.8</u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u>2.0</u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u>3.0</u>	<u> </u>

Remarks:

Appendix A

Test No.: 10 Date: 3/29/69 Time 0840
 Average wind velocity, knots: 11 Wind direction, °: 200
 Maximum wind velocity, knots: 18 Air temperature, °F: 51
 Minimum wind velocity, knots: 3 Relative humidity, %: 63
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 10.0 Average weight, kg: 9.057
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u>2.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u>3.0</u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.5</u>	<u>1.7</u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u>2.2</u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u>2.8</u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u>2.9</u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 13.3 Average weight, kg: 9.773
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u>5.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u>6.0</u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u>1.6</u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u>4.5</u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u>5.3</u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u>6.0</u>	<u> </u>	<u> </u>

Remarks:

Test No.: 11 Date: 3/29/69 Time 0925
 Average wind velocity, knots: 5 Wind direction, °: 190
 Maximum wind velocity, knots: 14 Air temperature, °F: 54
 Minimum wind velocity, knots: 2 Relative humidity, %: 55
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH
 Average moisture content, %: 17.4 Average weight, kg: 9.271
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>4.9</u>			
Time to conflagration, min:		<u>7.5</u>		
Time to reach 2nd level, min:	<u>1.3</u>	<u>1.5</u>		
Time to reach 3rd level, min:		<u>2.0</u>		
Time to reach 4th level, min:		<u>6.6</u>		
Time to reach 5th level, min:		<u>7.0</u>		

Shelter No. 2

Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH
 Average moisture content, %: 21.9 Average weight, kg: 12.410
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	
Time to cessation of flame, min:	<u>2.0</u>	<u>2.1</u>	<u>3.0</u>	
Time to conflagration, min:				
Time to reach 2nd level, min:				
Time to reach 3rd level, min:				
Time to reach 4th level, min:				
Time to reach 5th level, min:				

Remarks:

Appendix A

Test No.: 12 Date: 3/29/69 Time 1100
 Average wind velocity, knots: 10 Wind direction, °: 200
 Maximum wind velocity, knots: 18 Air temperature, °F: 62
 Minimum wind velocity, knots: 3 Relative humidity, %: 40
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH
 Average moisture content, %: 23.5 Average weight, kg: 12.317
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.0</u>	<u>2.5</u>	<u>2.6</u>	<u>7.3</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u>1.6</u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH
 Average moisture content, %: 20.8 Average weight, kg: 10.130
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.0</u>	<u>2.3</u>	<u>2.6</u>	<u>2.2</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Test No.: 13 Date: 3/29/69 Time: 1320
 Average wind velocity, knots: 8 Wind direction, °: 220
 Maximum wind velocity, knots: 11 Air temperature, °F: 64
 Minimum wind velocity, knots: 1 Relative humidity, %: 42
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH
 Average moisture content, %: 20.5 Average weight, kg: 10.230
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.3</u>	<u>5.7</u>	<u>3.5</u>	<u>2.3</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	<u>1.3</u>	_____	_____
Time to reach 3rd level, min:	_____	<u>2.0</u>	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH
 Average moisture content, %: 19.3 Average weight, kg: 9.586
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.5</u>	<u>7.5</u>	<u>2.3</u>	_____
Time to conflagration, min:	_____	_____	_____	<u>12.1</u>
Time to reach 2nd level, min:	<u>1.8</u>	<u>1.3</u>	_____	<u>3.0</u>
Time to reach 3rd level, min:	_____	<u>2.0</u>	_____	<u>10.5</u>
Time to reach 4th level, min:	_____	_____	_____	<u>11.5</u>
Time to reach 5th level, min:	_____	_____	_____	<u>11.9</u>

Remarks:

Appendix A

Test No.: 14 Date: 3/29/69 Time 1447
Average wind velocity, knots: 7 Wind direction, °: 220
Maximum wind velocity, knots: 13 Air temperature, °F: 65
Minimum wind velocity, knots: 2 Relative humidity, %: 32
Shelter No.: 1
Type of boxes: Code: F Description: Treated southern yellow pine
Conditioning: Dried 1 day at 155°F and low humidity
Average moisture content, %: 4.3* Average weight, kg: 10.480
Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.9</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
Conditioning: Dried 1 day at 155°F and low humidity
Average moisture content, %: 3.4* Average weight, kg: 8.665
Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>1.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>0.4</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>0.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>0.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>0.9</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

* Below scale on moisture meter, determined by oven drying.

Appendix A

Test No.: 15 Date: 3/29/69 Time 1540
 Average wind velocity, knots: 6 Wind direction, °: 290
 Maximum wind velocity, knots: 9 Air temperature, °F: 65
 Minimum wind velocity, knots: 1 Relative humidity, %: 33
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Dried 1 day at 155°F and low humidity
 Average moisture content, %: 2.1* Average weight, kg: 8.414
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>0.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>0.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>0.9</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Dried 1 day at 155°F and low humidity
 Average moisture content, %: 2.6* Average weight, kg: 10.509
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>3.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>2.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>2.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.9</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

* Below scale on moisture meter, determined by oven drying.

Appendix A

Test No.: 16 Date: 3/29/69 Time 1635
Average wind velocity, knots: 11 Wind direction, °: 340
Maximum wind velocity, knots: 16 Air temperature, °F: 63
Minimum wind velocity, knots: 4 Relative humidity, %: 45
Shelter No.: 1
Type of boxes: Code: C Description: Untreated spruce
Conditioning: Dried 1 day at 155°F and low humidity
Average moisture content, %: 4.0* Average weight, kg: 8.902
Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.2</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>1.2</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>0.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>0.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>0.9</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.0</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
Type of boxes: Code: A Description: Treated ponderosa pine
Conditioning: Dried 1 day at 155°F and low humidity
Average moisture content, %: 2.5* Average weight, kg: 8.580
Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>0.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>0.9</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

* Below scale on moisture meter, determined by oven drying.

Appendix A

Test No.: 17 Date: 3/30/69 Time 0840
 Average wind velocity, knots: 6 Wind direction, °: 360
 Maximum wind velocity, knots: 10 Air temperature, °F: 41
 Minimum wind velocity, knots: 3 Relative humidity, %: 37
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 8.9 Average weight, kg: 9.029
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>7.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>5.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>6.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>7.0</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Box-dipped in Woodlife (3/28) and stored in unventilated chamber
 Average moisture content, %: 12.3 Average weight, kg: 10.160
 Residual solvent and volatiles: Definite presence of solvents by dye test

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>3.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>2.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>3.0</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 18 Date: 3/30/69 Time 0945
 Average wind velocity, knots: 4 Wind direction, °: 340
 Maximum wind velocity, knots: 7 Air temperature, °F: 40
 Minimum wind velocity, knots: 0 Relative humidity, %: 37
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Box-dipped in Woodlife (3/28) and stored in unventilated chamber
 Average moisture content, %: 11.7 Average weight, kg: 10.011
 Residual solvent and volatiles: Definite presence of residual solvent by dye test

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.8</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>1.8</u>			
Time to reach 2nd level, min:	<u>0.6</u>			
Time to reach 3rd level, min:	<u>1.3</u>			
Time to reach 4th level, min:	<u>1.5</u>			
Time to reach 5th level, min:	<u>1.8</u>			

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 11.7 Average weight, kg: 8.966
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>2.0</u>			
Time to reach 2nd level, min:	<u>1.2</u>			
Time to reach 3rd level, min:	<u>1.5</u>			
Time to reach 4th level, min:	<u>1.7</u>			
Time to reach 5th level, min:	<u>1.8</u>			

Remarks:

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Test No.: 19 Date: 3/30/69 Time 1405
 Average wind velocity, knots: 3 Wind direction, °: 240
 Maximum wind velocity, knots: 7 Air temperature, °F: 42
 Minimum wind velocity, knots: 1 Relative humidity, %: 56
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 10.5 Average weight, kg: 8.946
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.9</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 8.5 Average weight, kg: 12.007
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>8.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>2.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>5.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>7.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>7.6</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 20 Date: 3/30/69 Time: 1425
 Average wind velocity, knots: 6 Wind direction, °: 280
 Maximum wind velocity, knots: 10 Air temperature, °F: 42
 Minimum wind velocity, knots: 1 Relative humidity, %: 60
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 11.0 Average weight, kg: 11.726
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>3.2</u>			
Time to conflagration, min:		<u>4.5</u>		
Time to reach 2nd level, min:	<u>2.1</u>	<u>1.3</u>		
Time to reach 3rd level, min:		<u>2.0</u>		
Time to reach 4th level, min:		<u>3.3</u>		
Time to reach 5th level, min:		<u>4.2</u>		

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 10.9 Average weight, kg: 9.195
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>2.5</u>			
Time to reach 2nd level, min:	<u>1.3</u>			
Time to reach 3rd level, min:	<u>2.0</u>			
Time to reach 4th level, min:	<u>2.3</u>			
Time to reach 5th level, min:	<u>2.4</u>			

Remarks:

Appendix A

Test No.: 21 Date: 4/7/69 Time: 0933
 Average wind velocity, knots: 4 Wind direction, °: 270
 Maximum wind velocity, knots: 7 Air temperature, °F: 58
 Minimum wind velocity, knots: 0 Relative humidity, %: 20
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Coated with intumescent latex paint, flame shield 76 (3/30)
 Average moisture content, %: 8.8 Average weight, kg: 9.391
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2*	Trial No. 3*	Trial No. 4*
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>7.5</u>	<u>2.2</u>	<u>16.2</u>	<u>2.0</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 11.9 Average weight, kg: 9.436
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>4.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>3.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>3.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>3.6</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

* Boxes were removed to shelter 2 after trial No. 1 and set up in reverse position for trials No. 2, 3, 4, and 5. In trial No. 5, the duration of the flame source was 2.0 minutes and the cessation of burning 3.9 minutes.

Appendix A

Test No.: 22 Date: 4/7/69 Time: 1102
 Average wind velocity, knots: 6 Wind direction, °: 220
 Maximum wind velocity, knots: 13 Air temperature, °F: 64
 Minimum wind velocity, knots: 1 Relative humidity, %: 21
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 9.0 Average weight, kg: 8.983
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:	<u>2.2</u>			
Time to conflagration, min:				
Time to reach 2nd level, min:	<u>0.9</u>			
Time to reach 3rd level, min:	<u>1.5</u>			
Time to reach 4th level, min:	<u>1.9</u>			
Time to reach 5th level, min:	<u>2.1</u>			

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Coated with intumescent solvent-type paint, flame shield 38 (3/30)
 Average moisture content, %: 8.4 Average weight, kg: 9.311
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>2.5</u>			
Time to conflagration, min:		<u>36.5</u>		
Time to reach 2nd level, min:		<u>1.3</u>		
Time to reach 3rd level, min:		<u>34.0</u>		
Time to reach 4th level, min:		<u>35.7</u>		
Time to reach 5th level, min:		<u>36.3</u>		

Remarks:

Appendix A

Test No.: 23 Date: 4/7/69 Time: 1317
 Average wind velocity, knots: 8 Wind direction, °: 240
 Maximum wind velocity, knots: 13 Air temperature, °F: 56
 Minimum wind velocity, knots: 1 Relative humidity, %: 20
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 11.8 Average weight, kg: 9.434
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>4.9</u>			
Time to reach 2nd level, min:	<u>1.6</u>			
Time to reach 3rd level, min:	<u>3.7</u>			
Time to reach 4th level, min:	<u>4.7</u>			
Time to reach 5th level, min:	<u>4.8</u>			

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Sprayed with TCP in hexane
 Average moisture content, %: 11.7 Average weight, kg: 9.652
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>2.5</u>			
Time to reach 2nd level, min:	<u>1.6</u>			
Time to reach 3rd level, min:	<u>2.0</u>			
Time to reach 4th level, min:	<u>2.2</u>			
Time to reach 5th level, min:	<u>2.4</u>			

Remarks:

Appendix A

Test No.: 24 Date: 4/7/69 Time 1345
 Average wind velocity, knots: 9 Wind direction, °: 210
 Maximum wind velocity, knots: 15 Air temperature, °F: 67
 Minimum wind velocity, knots: 1 Relative humidity, %: 21
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: 3-minute Woodtox dip
 Average moisture content, %: 10.6 Average weight, kg: 9.572
 Residual solvent and volatiles: 0.69% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>3.4</u>			
Time to reach 2nd level, min:	<u>1.4</u>			
Time to reach 3rd level, min:	<u>2.5</u>			
Time to reach 4th level, min:	<u>2.9</u>			
Time to reach 5th level, min:	<u>3.3</u>			

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 12.2 Average weight, kg: 9.527
 Residual solvent and volatiles: 0.72% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>3.6</u>			
Time to conflagration, min:		<u>2.9</u>		
Time to reach 2nd level, min:		<u>1.5</u>		
Time to reach 3rd level, min:		<u>1.9</u>		
Time to reach 4th level, min:		<u>2.4</u>		
Time to reach 5th level, min:		<u>2.8</u>		

Remarks:

Appendix A

Test No.: 25 Date: 4/7/69 Time 1435
 Average wind velocity, knots: 9 Wind direction, °: 210
 Maximum wind velocity, knots: 15 Air temperature, °F: 69
 Minimum wind velocity, knots: 1 Relative humidity, %: 21
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: 3-minute Woodlife dip
 Average moisture content, %: 10.1 Average weight, kg: 9.489
 Residual solvent and volatiles: 0.16% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.2</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>0.8 /</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.4</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: 3-minute Woodtox dip
 Average moisture content, %: 9.7 Average weight, kg: 9.554
 Residual solvent and volatiles: 0.48% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.3</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 26 Date: 4/7/69 Time: 1553
 Average wind velocity, knots: 10 Wind direction, °: 210
 Maximum wind velocity, knots: 17 Air temperature, °F: 67
 Minimum wind velocity, knots: 2 Relative humidity, %: 21
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: As received
 Average moisture content, %: 12.5 Average weight, kg: 9.564
 Residual solvent and volatiles: 0.69% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>2.9</u>			
Time to reach 2nd level, min:	<u>0.9</u>			
Time to reach 3rd level, min:	<u>1.6</u>			
Time to reach 4th level, min:	<u>2.4</u>			
Time to reach 5th level, min:	<u>2.7</u>			

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: 3-minute Woodlife dip
 Average moisture content, %: 10.6 Average weight, kg: 9.443
 Residual solvent and volatiles: 0.15% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>3.0</u>			
Time to reach 2nd level, min:	<u>1.0</u>			
Time to reach 3rd level, min:	<u>2.2</u>			
Time to reach 4th level, min:	<u>2.7</u>			
Time to reach 5th level, min:	<u>2.8</u>			

Remarks:

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Test No.: 27 Date: 4/7/69 Time 1619
 Average wind velocity, knots: 9 Wind direction, °: 210
 Maximum wind velocity, knots: 15 Air temperature, °F: 64
 Minimum wind velocity, knots: 3 Relative humidity, %: 27
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: 3-minute Woodtox dip
 Average moisture content, %: 10.6 Average weight, kg: 9.712
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.4</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.2</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.2</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Dipped for 3-minutes in Woodtox with 25.8% TCP added.
 Average moisture content, %: 11.7 Average weight, kg: 9.489
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u>17.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u>2.7</u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u>1.8</u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u>2.1</u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u>2.3</u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u>2.5</u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 28 Date: 4/8/69 Time 0936
 Average wind velocity, knots: 6 Wind direction, °: 120
 Maximum wind velocity, knots: 7 Air temperature, °F: 64
 Minimum wind velocity, knots: 1 Relative humidity, %: 29
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Dipped for 3 minutes in Woodtox with 25.8% TCP added
 Average moisture content, %: 11.5 Average weight, kg: 9.818
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u>12.2</u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u>3.3</u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u>1.5</u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Three-minute Woodtox dip
 Average moisture content, %: 10.3 Average weight, kg: 9.586
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.9</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 29 Date: 4/8/69 Time 1106
 Average wind velocity, knots: 5 Wind direction, °: 150
 Maximum wind velocity, knots: 9 Air temperature, °F: 67
 Minimum wind velocity, knots: 2 Relative humidity, %: 22
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 2.8 Average weight, kg: 11.631
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>4.0</u>			
Time to conflagration, min:		<u>13.7</u>		
Time to reach 2nd level, min:		<u>1.6</u>		
Time to reach 3rd level, min:		<u>11.6</u>		
Time to reach 4th level, min:		<u>12.5</u>		
Time to reach 5th level, min:		<u>13.3</u>		

Shelter No. 2

Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Sprayed with TCP in perchloroethylene
 Average moisture content, %: 10.6 Average weight, kg: 10.615
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	
Time to cessation of flame, min:	<u>5.9</u>	<u>3.3</u>		
Time to conflagration, min:			<u>14.0</u>	
Time to reach 2nd level, min:			<u>1.7</u>	
Time to reach 3rd level, min:			<u>10.8</u>	
Time to reach 4th level, min:			<u>11.5</u>	
Time to reach 5th level, min:			<u>13.0</u>	

Remarks:

Appendix A

Test No.: 30 Date: 4/8/69 Time 1335
 Average wind velocity, knots: 6 Wind direction, °: 150
 Maximum wind velocity, knots: 10 Air temperature, °F: 71
 Minimum wind velocity, knots: 2 Relative humidity, %: 18
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Sprayed with 50% TCP (v/v) in perchloroethylene
 Average moisture content, %: 11.4 Average weight, kg: 11.560
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>16.7</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.9</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>14.7</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>15.7</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>16.3</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 9.8 Average weight, kg: 12.170
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>14.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>2.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>12.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>13.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>13.8</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 31 Date: 4/8/69 Time 1411
 Average wind velocity, knots: 5 Wind direction, °: 140
 Maximum wind velocity, knots: 8 Air temperature, °F: 72
 Minimum wind velocity, knots: 3 Relative humidity, %: 18
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 9.3 Average weight, kg: 8.550
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>2.1</u>			
Time to reach 2nd level, min:	<u>1.0</u>			
Time to reach 3rd level, min:	<u>1.6</u>			
Time to reach 4th level, min:	<u>1.8</u>			
Time to reach 5th level, min:	<u>2.0</u>			

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Sprayed with 50% TCP (v/v) in perchloroethylene
 Average moisture content, %: 10.3 Average weight, kg: 9.355
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>8.7</u>			
Time to reach 2nd level, min:	<u>1.1</u>			
Time to reach 3rd level, min:	<u>7.5</u>			
Time to reach 4th level, min:	<u>8.3</u>			
Time to reach 5th level, min:	<u>8.5</u>			

Remarks:

Appendix A

Test No.: 32 Date: 4/8/69 Time 1500
 Average wind velocity, knots: 7 Wind direction, °: 160
 Maximum wind velocity, knots: 9 Air temperature, °F: 74
 Minimum wind velocity, knots: 4 Relative humidity, %: 18
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Sprayed with 50% TCP (v/v) in perchloroethylene
 Average moisture content, %: 9.7 Average weight, kg: 9.020
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 9.6 Average weight, kg: 8.914
 Residual solvent and volatiles: 0.32% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.4</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.6</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 33 Date: 4/8/69 Time 1521-1545
 Average wind velocity, knots: 4 Wind direction, °: 140
 Maximum wind velocity, knots: 8 Air temperature, °F: 73
 Minimum wind velocity, knots: 1 Relative humidity, %: 20
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 9.8 Average weight, kg: 8.984
 Residual solvent and volatiles: 0.28% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>			
Time to cessation of flame, min:				
Time to conflagration, min:	<u>1.8</u>			
Time to reach 2nd level, min:	<u>1.0</u>			
Time to reach 3rd level, min:	<u>1.3</u>			
Time to reach 4th level, min:	<u>1.5</u>			
Time to reach 5th level, min:	<u>1.6</u>			

Shelter No. 2

Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Dipped for 3 minutes in Woodlife preservative solution
 Average moisture content, %: 10.6 Average weight, kg: 12.310
 Residual solvent and volatiles: 0.28% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>		
Time to cessation of flame, min:	<u>16.0</u>			
Time to conflagration, min:		<u>3.5</u>		
Time to reach 2nd level, min:		<u>1.8</u>		
Time to reach 3rd level, min:		<u>2.6</u>		
Time to reach 4th level, min:		<u>3.0</u>		
Time to reach 5th level, min:		<u>3.1</u>		

Remarks:

Appendix A

Test No.: 34 Date: 4/8/69 Time 1615
 Average wind velocity, knots: 4 Wind direction, °: 150
 Maximum wind velocity, knots: 6 Air temperature, °F: 73
 Minimum wind velocity, knots: 1 Relative humidity, %: 20
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Dipped for 3 minutes in Woodlife preservative solution
 Average moisture content, %: 11.9 Average weight, kg: 12.374
 Residual solvent and volatiles: 0.29% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>4.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>3.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>3.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>3.9</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: As received
 Average moisture content, %: 9.8 Average weight, kg:
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>0.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.5</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.8</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 35 Date: 4/10/69 Time: 0934
 Average wind velocity, knots: 10 Wind direction, °: 330
 Maximum wind velocity, knots: 16 Air temperature, °F: 57
 Minimum wind velocity, knots: 2 Relative humidity, %: 40
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 14.2 Average weight, kg: 11.820
 Residual solvent and volatiles: 0.05% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4 *
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>3.2</u>	<u>2.3</u>	<u>2.1</u>	<u>3.0</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Dipped for 3 minutes in Woodtox preservative solution on 9 April.
 Average moisture content, %: 11.4 Average weight, kg: 11.819
 Residual solvent and volatiles: 0.48% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4 **
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>4.1</u>	<u>3.9</u>	<u>2.3</u>	<u>3.8</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

* On 11 April were retested with box pile reversed; on first (No. 5) trial flame ceased at 3.3 minutes and on second trial conflagration was obtained at 16.8 minutes.

** On 11 April were retested with box pile reversed; on first (No. 5) trial flame ceased at 3.1 minutes and on second trial conflagration was obtained at 5.0 minutes.

Appendix A

Test No.: 36 Date: 4/11/69 Time: 1108-1145
 Average wind velocity, knots: 10 Wind direction, °: 360
 Maximum wind velocity, knots: 18 Air temperature, °F: 59
 Minimum wind velocity, knots: Relative humidity, %: 33
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: Dipped for 3 minutes in Woodtox preservative solution on 4/10
 Average moisture content, %: 12.2 Average weight, kg: 11.922
 Residual solvent and volatiles: 0.22% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.3</u>	<u>2.8</u>	<u>4.1</u>	<u>3.3</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: F Description: Treated southern yellow pine
 Conditioning: As received
 Average moisture content, %: 14.1 Average weight, kg: 11.877
 Residual solvent and volatiles: 0.07% (sample from lid)

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u>3.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u> </u>	<u>17.3</u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u>2.0</u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u>14.5</u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u>16.0</u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u>16.8</u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 37 Date: 4/13/69 Time 0829
 Average wind velocity, knots: _____ Wind direction, °: _____
 Maximum wind velocity, knots: _____ Air temperature, °F: 52
 Minimum wind velocity, knots: _____ Relative humidity, %: 50
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: One coat of fire-retardant latex paint (MS) applied 4/11 and dried overnight at 155°F.
 Average moisture content, %: <7 Average weight, kg: 8.794
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4*
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.5</u>	<u>2.1</u>	<u>2.3</u>	<u>2.5</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	<u>1.8</u>	_____	_____	<u>1.8</u>
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Shelter No. 2
 Type of boxes: Code: A Description: Treated ponderosa pine
 Conditioning: One coat of white epoxy paint (B) applied 4/11 and dried overnight at 155°F.
 Average moisture content, %: 7.2 Average weight, kg: 8.703
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.3</u>	_____	_____	_____
Time to cessation of flame, min:	_____	_____	_____	_____
Time to conflagration, min:	<u>1.3</u>	_____	_____	_____
Time to reach 2nd level, min:	<u>0.8</u>	_____	_____	_____
Time to reach 3rd level, min:	<u>1.1</u>	_____	_____	_____
Time to reach 4th level, min:	<u>1.3</u>	_____	_____	_____
Time to reach 5th level, min:	<u>1.3</u>	_____	_____	_____

Remarks:

* For 5th trial the bottom two boxes were removed and replaced by two boxes from shelter No. 2, which readily ignited, and the pile was in conflagration in 3.5 minutes.

Appendix A

Test No.: 38 Date: 4/13/69 Time 0926
 Average wind velocity, knots: _____ Wind direction, °: _____
 Maximum wind velocity, knots: _____ Air temperature, °F: 56
 Minimum wind velocity, knots: _____ Relative humidity, %: 37
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: One coat of green epoxy paint (B) applied 4/12 and dried overnight at 155°F.
 Average moisture content, %: 8.4 Average weight, kg: 8.783
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>1.0</u>	_____	_____	_____
Time to cessation of flame, min:	_____	_____	_____	_____
Time to conflagration, min:	<u>1.0</u>	_____	_____	_____
Time to reach 2nd level, min:	<u>0.6</u>	_____	_____	_____
Time to reach 3rd level, min:	<u>0.8</u>	_____	_____	_____
Time to reach 4th level, min:	<u>1.0</u>	_____	_____	_____
Time to reach 5th level, min:	<u>1.0</u>	_____	_____	_____

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: One of latex fire-retardant paint (MS) applied 4/11 and dried overnight at 155°F
 Average moisture content, %: <7 Average weight, kg: 8.475
 Residual solvent and volatiles: Not applicable

	Trial No. 1 *	Trial No. 2	Trial No. 3	Trial No. 4 **
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>10.2</u>	<u>4.7</u>	<u>2.3</u>	<u>7.6</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	_____	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Remarks:

* In trial No. 1, a small flame was observed, on one bottom box, at a location where sap was oozing. The small flame continued for the 10 minutes recorded. The same spot was responsible for the flame times recorded in the trials 2 and 4.

** For the 5th and 6th trial ignition was by napalm placed on the 2nd and 3rd layers of boxes, respectively. In the 5th trial the flame ceased after 4.6 minutes, and in the 6th trial moderate burning of the pole was evident after 15 minutes, and the test was ended.

Test No.: 39 Date: 4/13/69 Time 1043
 Average wind velocity, knots: _____ Wind direction, °: _____
 Maximum wind velocity, knots: _____ Air temperature, °F: 59
 Minimum wind velocity, knots: _____ Relative humidity, %: 30
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: One coat of fire-retardant latex paint applied 4/11 and dried overnight at 155°F.
 Average moisture content, %: 7.9 Average weight, kg: 9.169
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4 *
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>15.0</u>	<u>5.1</u>	<u>2.2</u>	<u>2.1</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	_____	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Sprayed intermittently with water over a 2-day period
 Average moisture content, %: 14.9 Average weight, kg: 9.500
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4 *
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.8</u>	<u>6.0</u>	<u>4.0</u>	<u>2.3</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	<u>1.3</u>	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Remarks:

* About 110 cc of napalm was placed on the second layer of boxes and ignited for the 5th trials. A conflagration occurred in 3.0 minutes with the boxes in Shelter No. 2 (wet) and there was moderate burning of the boxes in Shelter No. 1 (painted) within a few minutes.

Appendix A

Test No.: 40 Date: 4/13/69 Time 1206
 Average wind velocity, knots: _____ Wind direction, °: _____
 Maximum wind velocity, knots: _____ Air temperature, °F: 62
 Minimum wind velocity, knots: _____ Relative humidity, %: 26
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Sprayed intermittently with water over a 2-day period
 Average moisture content, %: 11.3 Average weight, kg: 9.150
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	_____	_____	_____
Time to cessation of flame, min:	_____	_____	_____	_____
Time to conflagration, min:	<u>10.3</u>	_____	_____	_____
Time to reach 2nd level, min:	<u>1.2</u>	_____	_____	_____
Time to reach 3rd level, min:	<u>9.2</u>	_____	_____	_____
Time to reach 4th level, min:	<u>9.9</u>	_____	_____	_____
Time to reach 5th level, min:	<u>10.2</u>	_____	_____	_____

Shelter No. 2

Type of boxes: Code: C Description: Untreated spruce
 Conditioning: One coat of fire-retardant latex paint (MS) applied 4/11 and dried overnight at 155°F.
 Average moisture content, %: ~7 Average weight, kg: 9.833
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4 *
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.0</u>	<u>2.7</u>	<u>3.0</u>	<u>2.0</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	_____	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Remarks:

* For 5th trial, about 20 cc of napalm was placed on 3rd layer of boxes and ignited. All flame, ceased at 4.0 minutes. For 6th trial, about 50 cc of napalm was placed on 3rd layer (other end of boxes) and ignited. In 22 minutes boxes were burning at a moderate rate.

Appendix A

Test No.: 41 Date: 4/29/69 Time 1040
 Average wind velocity, knots: 8 Wind direction, °: 210
 Maximum wind velocity, knots: _____ Air temperature, °F: 77
 Minimum wind velocity, knots: _____ Relative humidity, %: 48
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Two coats (4/22 and 4/26) MIL-P-52024B paint
 Average moisture content, %: 8.1 Average weight, kg: 9.190
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.4*</u>	<u>2.2</u>	<u>2.2</u>	<u>4.7</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	<u>1.0</u>	_____	_____	_____
Time to reach 3rd level, min:	<u>1.3</u>	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Shelter No. 2

Type of boxes: Code: FR Description: Treated southern yellow pine (reused)
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.
 Average moisture content, %: 16.4 Average weight, kg: 1192.6
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>3.5</u>	<u>2.3</u>	<u>3.5</u>	<u>2.2</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	_____	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Remarks:

* Cleat on box in position 3 (2nd level) smouldered for about 20 minutes in trial No. 1.

Appendix A

Test No.: 42 Date: 4/29/69 Time: 1334
 Average wind velocity, knots: 12 Wind direction, °: 210
 Maximum wind velocity, knots: _____ Air temperature, °F: 83
 Minimum wind velocity, knots: _____ Relative humidity, %: 40
 Shelter No.: 1
 Type of boxes: Code: FR Description: Treated southern yellow pine (reused)
 Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.
 Average moisture content, %: 18.4 Average weight, kg: 12.131
 Residual solvent and volatiles: Not determined

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	_____
Time to cessation of flame, min:	<u>2.1</u>	<u>3.6</u>	_____	_____
Time to conflagration, min:	_____	_____	<u>15.3</u>	_____
Time to reach 2nd level, min:	_____	<u>1.5</u>	<u>3.5</u>	_____
Time to reach 3rd level, min:	_____	_____	<u>10.6</u>	_____
Time to reach 4th level, min:	_____	_____	<u>13.8</u>	_____
Time to reach 5th level, min:	_____	_____	<u>15.1</u>	_____

Shelter No. 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: Two coats (4/22 and 4/26) MIL-P-52024B paint
 Average moisture content, %: 8.5 Average weight, kg: 8.918
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.4</u>	<u>2.3</u>	<u>2.2</u>	<u>2.0</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	_____	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Remarks:

Appendix A

Test No.: 43 Date: 5/5/69 Time: 1300-1315
 Average wind velocity, knots: 2 Wind direction, °: 10
 Maximum wind velocity, knots: 3 Air temperature, °F: 80
 Minimum wind velocity, knots: 1 Relative humidity, %: 22
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: One coat MIL-P-52024B paint (applied 4/29)
 Average moisture content, %: 8.5 Average weight, kg: 9.139
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>1.6</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>1.7</u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine
 Conditioning: One coat MIL-P-52024B paint (applied 4/29)
 Average moisture content, %: 9.7 Average weight, kg: 9.292
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to cessation of flame, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to conflagration, min:	<u>2.2</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u>1.1</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u>1.3</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u>2.0</u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u>2.1</u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

Appendix A

Test No.: 44 Date: 5/26/69 Time 1016-1140
 Average wind velocity, knots: 6 Wind direction, °: 030-360
 Maximum wind velocity, knots: 12 Air temperature, °F: 61-63
 Minimum wind velocity, knots: 0 Relative humidity, %: 40-36
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: One coat MIL-C-46081 epoxy intumescent paint applied 5/20
 Average moisture content, %: 9.4 Average weight, kg: 9.320
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.1</u>	<u>2.2</u>	<u>2.5</u>	<u>4.6</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce
 Conditioning: Two coats MIL-C-46081 paint applied 5/20 and 5/21
 Average moisture content, %: 8.6 Average weight, kg: 9.854
 Residual solvent and volatiles: Not applicable

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.0</u>	<u>2.4</u>	<u>2.3</u>	<u>2.3</u>
Time to conflagration, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 2nd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 3rd level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 4th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Time to reach 5th level, min:	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Remarks:

All burning subsequent to the removal of the flame source was apparently due to sap driven from the wood.

To derive additional data, the order of the boxes on each stack was reversed after trial No. 4, and the test repeated. See data for test No 44A.

Appendix A

Test No.: 44A Date: 5/26/69 Time 1016-1140
 Average wind velocity, knots: _____ Wind direction, °: _____
 Maximum wind velocity, knots: _____ Air temperature, °F: _____
 Minimum wind velocity, knots: _____ Relative humidity, %: _____
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce, test No. 44 continued
 Conditioning: One coat MIL-C-46081 paint
 Average moisture content, %: _____ Average weight, kg: _____
 Residual solvent and volatiles: _____

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>3.2</u>	<u>4.0</u>	<u>4.8</u>	<u>2.0</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	_____	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Shelter No. 2
 Type of boxes: Code: C Description: Untreated spruce, test No 44 continued
 Conditioning: Two coats MIL-C-46081 paint
 Average moisture content, %: _____ Average weight, kg: _____
 Residual solvent and volatiles: _____

	Trial No. 1	Trial No. 2	Trial No. 3	Trial No. 4
Duration of flame source, min:	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>
Time to cessation of flame, min:	<u>2.1</u>	<u>2.3</u>	<u>4.3</u>	<u>2.3</u>
Time to conflagration, min:	_____	_____	_____	_____
Time to reach 2nd level, min:	_____	_____	_____	_____
Time to reach 3rd level, min:	_____	_____	_____	_____
Time to reach 4th level, min:	_____	_____	_____	_____
Time to reach 5th level, min:	_____	_____	_____	_____

Remarks:

After the eighth attempt to ignite the boxes (Trial 4 of Test 44A), the bottom two boxes of each stack were replaced with boxes coated with epoxy paint which was not intumescent. In shelter 1, conflagration was achieved within the 2 minutes after the flame source was initiated. In shelter 2, the ignition source had to be applied twice before conflagration was achieved. In the first attempt, the time to cessation of flame was 6.8 minutes. In the second attempt, the time to conflagration was 7.8 minutes.

APPENDIX B

INDIVIDUAL BOX WEIGHTS AND MOISTURE CONTENTS

Test No.: 1 Date: 3/27/69 Time: 0920

Shelter No.: 1

Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C1	1					9.685	12.0, 11.9, 15.4, 11.9	9.555	13.8, 11.0
C2	2					9.650	12.2, 14.1	9.530	10.0, 12.2
C3	3					10.300	14.0, 11.8, 11.0, 14.1	10.250	12.0, 10.5
C4	4					9.265	13.0, 14.0	9.210	12.0, 12.2
C5	5					9.830	17.2, 17.0	9.740	14.2, 10.5
C6	6					9.530	13.9, 13.0	9.465	11.5, 12.2
C7	7					10.675	12.8, 12.4	10.610	12.8, 14.2
C8	8					9.790	14.0, 14.0	9.720	12.6, 13.2
C9	9					9.530	12.2, 13.0	9.455	13.3, 13.0
C10	10					10.085	13.9, 15.0	10.030	13.8, 13.0
Average:						9.834	13.5	9.756	12.4
Std. Dev.:						0.416	1.56	0.424	1.23

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Test No.: 1 Date: 3/27/69 Time: 0920
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A1	1					9.660	13.5, 13.0		
A2	2					9.690	10.8, 12.0		
A3	3					9.600	13.9, 15.0		
A4	4					8.210	10.5, 8.5		
A5	5					9.060	8.8, 8.5		
A6	6					9.055	10.3, 11.0		
A7	7					8.795	10.0, 12.9, 13.0, 14.0		
A8	8					9.055	10.9, 9.5		
A9	9					11.180	11.8, 12.8		
A10	10					9.130	9.8, 9.8		
Average:						9.343	11.4		
Std. Dev.:						0.784	1.91		

Test No.: 2 Date: 3/27/69 Time: 1059
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A31	1					8.930	12.3, 11.0		
A32	2					9.285	8.0, 13.0		
A33	3					9.375	11.5, 11.0		
A34	4					9.340	11.8, 9.8		
A35	5					9.025	11.5, 9.5		
A36	6					9.835	14.8, 10.8		
A37	7					8.650	10.5, 10.8		
A38	8					10.115	10.2, 10.3		
A39	9					9.555	13.5, 12.0		
A40	10					9.725	11.8, 12.0		
Average:						9.384	11.3		
Std. Dev.:						0.443	1.49		

Test No.: 2 Date: 3/27/69 Time: 1059

Shelter No.: 2

Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C31	1					9.750	12.2, 16.2		
C32	2					9.555	10.2, 13.0		
C33	3					9.915	13.0, 9.5		
C34	4					10.530	12.5, 11.8		
C35	5					9.960	13.2, 11.9		
C36	6					9.290	10.2, 9.0		
C37	7					7.520	13.8, 12.2		
C38	8					9.555	15.0, 11.8		
C39	9					9.875	12.8, 12.0		
C40	10					8.895	13.8, 16.2		
Average:						9.485	12.5		
Std. Dev.:						0.815	1.94		

Test No.: 3 Date: 3/27/69 Time: 1308

Shelter No.: 1

Type of boxes: C Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C61	1					10.080	11.2, 16.5, 17.0, 9.5		
C62	2					9.235	14.0, 12.8		
C63	3					9.810	10.5, 20.0, 12.0, 12.0		
C64	4					9.800	14.2, 13.2		
C65	5					10.040	13.2, 13.0, 19.8, 24.0		
C66	6					9.540	11.3, 10.0, 18.5, 13.0		
C67	7					9.210	12.6, 10.3		
C68	8					9.990	16.2, 16.3, 11.5, 13.0		
C69	9					9.295	11.0, 14.0		
C70	10					9.255	11.0, 13.2		
Average:						9.626	13.8		
Std. Dev.:						0.358	3.39		

Test No.: 3 Date: 3/27/69 Time: 1308

Shelter No.: 2

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F41	1					11.125	14.0, 14.2	10.925	13.2, 10.8
F42	2					12.060	10.5, 13.4	11.870	10.0, 11.0
F43	3					11.830	12.5, 8.5	11.775	12.8, 10.0
F44	4					11.150	11.5, 13.5	11.060	9.0, 13.0
F45	5					11.955	13.8, 12.2	11.900	12.1, 12.1
F46	6					12.770	11.0, 12.0	12.740	12.0, 13.0
F47	7					12.640	10.1, 7.5	12.600	10.0, 7.3
F48	8					12.640	12.0, 12.3	12.945	12.0, 12.0
F49	9					11.670	10.3, 14.4	11.635	9.8, 13.8
F50	10					12.760	14.2, 13.8	12.705	14.8, 13.8
Average:						12.060	12.1	12.015	11.6
Std. Dev.:						0.631	1.96	0.710	1.86

Test No.: 4 Date: 3/27/69 Time: 1607
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F51	1					11.900	11.0, 11.9	11.815	11.0, 12.0
F52	2					12.590	10.0, 9.2	12.495	10.0, 7.5
F53	3					12.330	12.0, 13.0	12.300	11.9, 12.5
F54	4					12.720	12.0, 14.2	12.705	10.8, 8.5
F55	5					11.620	10.0, 12.1	11.605	11.0, 13.0
F56	6					12.000	11.4, 13.8	11.980	11.8, 14.0
F57	7					12.190	10.3, 13.7	12.165	11.4, 13.0
F58	8					12.940	12.2, 13.0	12.920	12.1, 13.0
F59	9					11.830	13.0, 13.2	11.900	12.2, 12.2
F60	10					12.350	12.1, 9.5	12.335	12.0, 8.0
Average: Std. Dev.:						12.247 0.420	11.9 1.49	12.222 0.412	11.4 1.72

Test No.: 4 Date: 3/27/69 Time: 1607

Shelter No.: 2

Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist., %	After burning Wt, kg Moist., %
C91	1			9.480 13.0, 8.2	
C92	2			9.460 13.2, 16.2	
C93	3			10.095 11.0, 10.8	
C94	4			10.175 14.0, 11.7	
C95	5			9.590 13.0, 13.9	
C96	6			9.860 15.0, 11.0	
C97	7			9.500 12.2, 12.2	
C98	8			10.000 13.2, 18.0	
C99	9			9.385 13.8, 13.0	
C100	10			9.380 13.9, 13.7	
Average:				9.693 13.0	
Std. Dev.:				0.308 2.08	

Test No.: 5 Date: 3/28/69 Time: 0900

Shelter No.: 1

Type of boxes: Code: A Description: Shock-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A61	1					9.775	11.8, 11.0		
A62	2					9.475	7.8, 12.8		
A63	3					9.035	9.8, 10.8, 16.0, 14.0		
A64	4					9.510	10.8, 8.9		
A65	5					8.795	10.0, 9.8		
A66	6					8.920	13.4, 9.8		
A67	7					9.360	9.4, 10.8		
A68	8					9.600	11.7, 8.6		
A69	9					9.060	12.0, 8.9		
A70	10					9.170	8.0, 11.4		
Average: Std. Dev.:						9.270 0.321	10.8 2.03		

Test No.: 5 Date: 3/28/69 Time: 0900
 Shelter No.: 2
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist, %	Wt, kg	Moist, %	Wt, kg	Moist, %	Wt, kg	Moist, %
F61	1					12.450	11.0, 12.8	12.180	13.0, 13.2
F62	2					12.390	13.0, 14.0	12.240	13.0, 15.0
F63	3					12.030	12.1, 10.8, 17.8, 16.0	11.890	11.3, 12.2
F64	4					12.740	11.0, 13.0	12.715	12.0, 12.7
F65	5					11.940	12.0, 13.0	11.900	11.2, 12.1
F66	6					10.910	12.9, 14.0	10.870	11.8, 9.4
F67	7					12.255	12.2, 14.0	12.220	12.0, 11.0
F68	8					12.720	13.0, 10.9	12.670	10.7, 11.8
F69	9					12.015	11.9, 12.2	11.955	12.1, 12.3
F70	10					12.145	9.8, 13.0	12.105	10.2, 12.2
Average:						12.160	12.7	12.074	12.0
Std. Dev.:						0.521	1.76	0.511	1.19

Test No.: 6 Date: 3/28/69 Time: 1112

Shelter No.: 1

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F71	1					11.980	10.0, 12.4		
F72	2					12.250	11.0, 14.0		
F73	3					13.220	11.8, 15.0		
F74	4					12.420	12.0, 11.9		
F75	5					12.765	10.0, 9.8		
F76	6					12.770	11.8, 7.0		
F77	7					12.285	9.8, 10.2		
F78	8					11.445	9.8, 11.8		
F79	9					12.240	10.2, 7.2		
F80	10					12.665	8.0, 8.4		
Average:						12.404	10.6		
Std. Dev.:						0.490	2.07		

Test No.: 6 Date: 3/28/69 Time: 1112
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist., %	After burning Wt, kg Moist., %
A71	1			8.745 8.0, 8.6	
A72	2			9.375 11.0, 8.5	
A73	3			9.495 11.8, 9.7	
A74	4			8.375 11.8, 11.9	
A75	5			8.855 10.0, 9.8	
A76	6			9.225 9.3, 11.8	
A77	7			8.860 12.2, 11.8	
A78	8			9.165 9.0, 11.0	
A79	9			9.375 8.3, 8.8	
A80	10			9.200 12.2, 13.0	
Average:				9.067 10.4	
Std. Dev.:				0.349 1.59	

Test No.: 7 Date: 3/28/69 Time: 1520
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist., %	After burning Wt, kg Moist., %
C101	1			9.345 11.0, 14.2	
C102	2			9.885 11.8, 15.0	
C103	3			9.630 11.9, 12.0	
C104	4			9.405 13.2, 15.3	
C105	5			10.190 14.2, 13.9	
C106	6			11.255 12.0, 11.0	
C107	7			10.000 12.0, 15.0	
C108	8			9.450 10.0, 11.9	
C109	9			9.570 13.0, 12.8	
C110	10			9.575 13.8, 16.0	
Average: Std. Dev.:				9.810 13.0 0.571 1.67	

Test No.: 7 Date: 3/28/69 Time: 1520
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Box dipped in Woodlife (3/25)

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C71	1	9.235	11.9, 12.0			9.145	11.8, 9.3		
C72	2	9.530	10.2, 15.0			9.480	10.2, 11.0		
C73	3	10.580	11.8, 13.8			10.460	10.0, 12.8		
C74	4	9.565	12.0, 11.0			9.520	10.0, 8.9		
C75	5	9.310	14.0, 19.0			9.250	11.2, 13.0		
C76	6	9.005	10.6, 13.5			8.940	11.2, 11.0		
C77	7	9.320	11.5, 14.2			9.360	10.8, 9.8		
C78	8	9.155	10.2, 9.5			9.155	9.5, 13.8		
C79	9	9.630	15.9, 15.9			9.660	9.5, 12.0, 15.8, 11.0		
C80	10	9.305	9.5, 13.9			9.315	9.0, 9.3		
Average:		9.463	12.8			9.428	11.0		
Std. Dev.:		0.436	2.48			0.418	1.73		

Test No.: 8 Date: 3/28/69 Time: 1625
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Box dipped in Woodlife (3/25)

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C81	1	9.915	10.0, 11.8			9.825	10.0, 11.0		
C82	2	9.670	17.0, 17.5			9.565	11.0, 10.2		
C83	3	9.715	15.0, 13.9			9.540	9.8, 10.0		
C84	4	9.270	12.0, 11.0, 18.1, 12.0			9.210	9.13		
C85	5	10.155	16.0, 17.4			9.975	12.0, 13.0, 17.0, 11.8		
C86	6	9.380	14.0, 15.0			9.590	12.4, 12.4		
C87	7	9.380	12.1, 16.4			9.370	10.8, 12.2		
C88	8	9.975	26.0, 30.0			9.690	17.9, 14.8		
C89	9	9.215	12.1, 12.1			9.140	12.0, 13.0		
C90	10	9.550	11.7, 11.0			9.475	11.0, 9.4		
Average:		9.623	15.1			9.538	12.0		
Std. Dev.:		0.319	4.87			0.258	2.26		

Test No.: 8 Date: 3/28/69 Time: 1625
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
CI11	1					9.860	14.0, 11.9		
CI12	2					10.470	11.0, 9.0, 18.0, 12.0		
CI13	3					9.690	13.0, 10.0		
CI14	4					9.630	11.8, 14.0		
CI15	5					9.340	12.4, 15.0		
CI16	6					10.350	14.0, 17.0		
CI17	7					10.015	14.0, 14.2		
CI18	8					9.600	11.7, 14.0		
CI19	9					10.160	11.8, 11.9		
CI20	10					10.660	13.9, 13.0		
Average:						9.978	13.1		
Std. Dev.:						0.428	2.06		

Test No.: 9 Date: 3/29/69 Time: 0815

Shelter No.: 1

Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C141	9					10.150	13.9, 16.0		
C142	10					9.730	13.0, 17.0		
C143	1					9.640	15.1, 12.0		
C144	2					9.315	11.9, 12.1		
C145	3					10.100	13.7, 15.8		
C146	4					10.185	15.9, 14.0		
C147	5					9.430	14.0, 16.0		
C148	6					9.895	13.0, 15.9		
C149	7					9.670	13.0, 16.0		
C150	8					9.800	13.6, 11.8		
Average:						9.792	14.2		
Std. Dev.:						0.296	1.66		

Test No.: 9 Date: 3/29/69 Time: 0815
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A81	1					9.245	9.8, 10.0		
A82	8					8.820	8.0, 8.2		
A83	3					9.165	12.0, 11.0		
A84	4					9.005	9.8, 9.9		
A85	5					8.925	8.0, 7.8		
A86	6					8.645	13.2, 9.8		
A87	7					8.945	12.0, 13.0		
A88	2					8.650	8.2, 12.2		
A89	9					8.970	11.8, 9.0		
A90	10					9.655	13.0, 9.0		
Average:						9.002	10.3		
Std. Dev.:						0.299	1.85		

Test No.: 10 Date: 3/29/69 Time: 0840
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A91	3					8.875	9.8, 9.0		
A92	2					9.170	9.0, 9.8		
A93	1					9.595	11.8, 8.7		
A94	4					8.385	11.0, 9.4		
A95	5					9.005	10.2, 12.0		
A96	6					9.355	10.8, 9.8		
A97	7					8.895	8.9, 11.9		
A98	8					9.155	9.3, 8.6		
A99	9					9.550	8.9, 10.2		
A100	10					8.580	5.8, 13.7, 11.0		
Average:						9.057	10.0		
Std. Dev.:						0.392	1.53		

Test No.: 10 Date: 3/29/69 Time: 0840

Shelter No.: 2

Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C151	9					9.875	11.9, 12.0		
C152	10					9.300	12.2, 15.0		
C153	7					9.855	11.9, 11.8		
C154	8					9.995	13.2, 11.9		
C155	5					10.020	12.0, 13.0 18.0, 10.2		
C156	6					9.636	11.9, 13.4 20.0, 13.0		
C157	3					9.750	14.2, 14.6		
C158	4					9.470	13.0, 11.9		
C159	1					9.780	12.1, 14.0		
C160	2					10.050	15.0, 11.9		
Average: Std. Dev.:						9.773 0.245	13.3 2.14		

Test No.: 11 Date: 3/29/69 Time: 0925
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A11	5	9.095	12.0, 14.0			9.270	15.0, 16.4		
A12	10	8.270	11.9, 11.0			8.430	15.8, 15.0, 20.8, 16.0		
A13	3	9.345	8.5, 12.1			9.565	18.0, 15.0		
A14	4	9.130	7.5, 9.0, 13.9, 11.8			9.340	15.0, 17.0		
A15	1	8.930	11.4, 11.0			9.365	24.8, 18.0, 15.9, 19.0		
A16	6	9.685	11.0, 11.4			10.080	22.4, 22.6		
A17	7	9.185	12.1, 15.0			9.425	15.8, 15.9		
A18	8	9.125	12.0, 15.9			9.340	17.8, 19.7		
A19	9	8.615	11.0, 8.9			8.855	16.1, 17.0		
A20	2	8.840	14.0, 10.8			9.040	15.0, 15.0		
Average:		9.022	11.6			9.271	17.4		
Std. Dev.:		0.390	2.07			0.437	2.72		

Test No.: 11 Date: 3/29/69 Time: 0925

Shelter No.: 2

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F1	1	11.985	11.8, 12.4			12.345	19.0, 18.2	12.195	16.8, 18.0
F2	2	11.540	12.9, 11.8 17.9, 16.0			11.990	19.0, 24.0	11.850	18.2, 22.0
F3	3	11.840	14.0, 17.0			12.215	22.0, 21.0	12.160	20.0, 19.4
F4	4	11.690	13.0, 13.8 19.0, 18.4			11.855	34.0, 18.0, 20.0, 22.0	11.780	25.0, 16.0, 18.0, 19.8
F5	5	12.420	17.9, 19.0			12.710	25.0, 22.4	12.650	19.8, 20.0
F6	6	12.775	13.8, 14.1			13.140	16.2, 19.0	13.085	18.2, 17.0
F7	7	12.345	20.8, 18.0			12.620	25.0, 22.0	12.565	22.0, 19.8
F8	8	12.020	16.4, 20.0			12.260	22.0, 21.8, 26.0, 22.0	12.190	19.8, 24.0
F9	9	11.845	13.8, 12.2			12.160	20.2, 17.0	12.115	19.4, 15.0
F10	10	12.440	17.2, 17.0			12.810	26.0, 24.0	12.750	22.0, 21.0
Average:		12.090	15.8			12.410	21.9	12.334	19.6
Std. Dev.:		0.390	2.79			0.400	3.77	0.415	2.45

Test No.: 12 Date: 3/29/69 Time: 1100
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F11	1	11.755	18.0, 14.8			12.110	25.0, 19.8	11.715	21.2, 19.0
F12	2	12.645	12.9, 15.9			13.165	19.8, 21.9 25.0, 20.0	12.695	18.2, 20.0
F13	3	12.095	10.5, 14.0			12.415	19.0, 20.0, 25.0, 23.0	12.255	16.5, 18.0
F14	4	12.610	11.9, 15.9			13.005	19.0, 26.2, 25.0, 36.0	12.870	15.8, 40.0 21.0, 27.0
F15	5	11.325	15.8, 12.2 10.0, 15.9			11.700	30.0, 24.0, 21.0, 21.0	11.600	20.2, 18.3, 14.0, 20.1
F16	6	11.230	11.9, 12.4			11.665	18.2, 24.0	11.535	16.0, 20.0
F17	7	12.410	19.4, 18.9			12.815	28.0, 24.0	12.780	24.0, 24.1
F18	8	11.975	15.0, 17.0			12.415	24.8, 24.0	12.305	18.6, 20.4
F19	9	11.585	12.9, 11.0, 19.0, 10.8			12.005	19.8, 17.0	11.915	17.2, 15.4
F20	10	11.490	26.0, 11.5, 18.9, 15.0			11.875	32.0, 22.2 26.0, 24.0	11.760	30.0, 19.0 21.9, 20.1
Average: Std. Dev.:		11.912 0.520	14.7 3.63			12.317 0.538	23.5 4.19	12.143 0.508	20.6 5.30

Test No.: 12 Date: 3/29/69 Time: 1100
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C11	1	9.650	12.0, 10.8			10.155	17.0, 22.0, 26.0, 19.8	9.925	16.0, 19.8, 24.0, 15.7
C12	2	9.515	14.2, 13.7			10.220	22.0, 22.2	9.920	19.0, 19.4
C13	3	9.460	13.0, 11.8			10.040	20.0, 22.0, 25.0, 22.0	9.925	19.0, 17.0
C14	4	10.145	16.0, 16.2			10.690	22.0, 22.1	10.575	19.8, 20.0
C15	5	9.035	11.8, 11.8			9.650	18.0, 18.2	9.565	15.8, 17.8
C16	6	9.590	12.2, 12.8			10.170	25.0, 19.0, 19.0, 17.8	10.970	19.8, 17.0
C17	7	9.265	10.2, 13.0			9.805	17.4, 21.4	9.705	15.0, 15.9
C18	8	9.735	15.8, 12.0			10.100	19.9, 17.4	10.020	18.0, 16.0
C19	9	9.005	13.8, 17.4			9.600	22.0, 21.6	9.495	19.8, 21.0
C20	10	10.520	14.0, 18.0			10.865	19.6, 18.2, 26.0, 20.0	10.780	21.0, 22.0
Average:		9.592	13.5			10.130	20.8	10.008	18.6
Std. Dev.:		0.469	2.17			0.407	2.59	0.511	2.36

Test No.: 13 Date: 3/29/69 Time: 1320
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C21	1	9.810	13.0, 11.8			10.285	18.2, 19.0	9.925	17.0, 14.0
C22	2	10.300	16.0, 11.9			10.645	22.0, 16.4	10.335	19.0, 15.0
C23	3	9.825	16.8, 16.0			10.315	26.0, 22.0	10.150	19.9, 17.0
C24	4	9.415	14.0, 13.0			9.900	24.8, 32.0, 18.0, 18.0	9.730	22.2, 15.0
C25	5	9.560	15.0, 14.0			10.025	18.2, 19.0	9.900	17.0, 17.0
C26	6	10.090	13.4, 14.4			10.445	17.9, 19.0	10.325	17.9, 17.0
C27	7	9.605	14.0, 13.9			10.025	21.9, 19.7	9.885	18.0, 15.0
C28	8	9.655	14.2, 15.0			10.150	19.6, 19.2	10.015	17.8, 16.0
C29	9	10.005	15.8, 18.2			10.360	19.6, 17.0	10.240	18.0, 14.0
C30	10	9.650	11.9, 15.0			10.150	18.0, 22.0, 24.8, 19.4	9.995	14.0, 19.0, 20.0, 17.0
Average:		9.792	14.4			10.230	20.5	10.053	17.1
Std. Dev.:		0.272	1.67			0.224	3.52	0.206	2.13

Test No.: 13 Date: 3/29/69 Time: 1320
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Water sprayed and stored overnight at 113°F and 85% RH.

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A21	1	9.120	9.9, 10.4			9.385	17.0, 16.8		
A22	2	8.970	12.0, 8.9			9.305	17.0, 17.2		
A23	3	9.510	14.0, 13.8			9.740	20.2, 22.2		
A24	4	8.445	11.0, 10.0			8.700	23.0, 20.0		
A25	5	9.775	13.4, 11.0			10.105	20.0, 18.9		
A26	6	8.925	11.4, 10.2			9.220	20.0, 17.9		
A27	7	10.210	12.0, 13.9			10.435	25.0, 20.1		
A28	8	9.450	10.0, 9.9			9.750	17.4, 21.0		
A29	9	9.180	12.9, 11.0			9.525	17.0, 19.6, 25.0, 10.8		
A30	10	9.330	10.0, 12.4			9.695	17.0, 18.0, 20.0, 22.0		
Average:		9.292	11.4			9.586	19.3		
Std. Dev.:		0.489	1.56			0.482	3.04		

Test No.: 14 Date: 3/29/69 Time: 1447

Shelter No.: 1

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Dried 1 day at 155°F and low humidity

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %*	Wt, kg	Moist., %
F21	1	12.060	11.5, 10.5			10.595	4.6		
F22	2	11.390	13.8, 11.8			10.200			
F23	3	12.090	13.9, 14.8			10.705	4.3		
F24	4	12.260	14.0, 11.0			10.795			
F25	5	12.650	27.0, 11.0, 11.9, 18.0			10.645	2.5		
F26	6	12.220	13.8, 12.3			10.595			
F27	7	12.615	13.3, 14.0			10.555	6.9		
F28	8	11.185	12.0, 11.0			10.155			
F29	9	12.090	27.8, 12.2, 17.8, 26.2			10.130	3.2		
F30	10	11.715	13.8, 9.9			10.420			
Average:		12.028	14.9			10.480	4.3		
Std. Dev.:		0.477	5.1%			0.240	1.7		

* Determined by oven drying.

Test No.: 14 Date: 3/29/69 Time: 1447
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Dried 1 day at 155°F and low humidity

Box No.	Position in pile	Before conditioning	After conditioning	Prior to burning	After burning
C41	1	Wt, kg 9.270 Moist., % 13.2, 16.2	Wt, kg Moist., %	Wt, kg 8.300 Moist., % 3.4	Wt, kg Moist., %
C42	2	9.775 11.2, 13.5		8.770	
C43	3	9.510 13.5, 11.0		8.510 2.1	
C44	4	9.325 12.2, 16.0		8.255	
C45	5	9.815 13.0, 16.8		8.755 3.5	
C46	6	9.545 11.0, 10.5 18.0, 14.0		8.590	
C47	7	9.725 12.1, 13.2		8.760 3.5	
C48	8	9.995 13.0, 15.8		8.985	
C49	9	10.035 12.5, 14.0		9.105 4.3	
C50	10	9.575 15.2, 12.0		8.615	
Average:		9.657 13.5		8.665 3.4	
Std. Dev.:		0.259 2.08		0.270 0.79	

* Determined by oven drying.

Test No.: 15 Date: 3/29/69 Time: 1540
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Dried 1 day at 155°F and low humidity
 Conditioning:

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., % *	Wt, kg	Moist., %
A41	1	9.130	10.0, 11.7			8.400	2.3		
A42	2	9.130	12.0, 11.9			8.350			
A43	3	8.730	10.8, 10.8			8.060	2.3		
A44	4	8.555	8.3, 8.8, 17.5, 8.9			7.730			
A45	5	9.180	9.5, 12.2			8.345	1.7		
A46	6	9.050	8.5, 10.3			8.380			
A47	7	9.200	8.9, 11.0			8.400	2.3		
A48	8	9.440	10.0, 13.8			8.555			
A49	9	9.845	0.8, 0.9			8.950	2.1		
A50	10	9.905	13.8, 12.8			8.970			
Average:		9.217	10.8			8.414	2.1		
Std. Dev.:		0.427	2.28			0.368	0.26		

* Determined by oven drying.

Test No.: 15 Date: 3/29/69 Time: 1540
 Shelter No.: 2
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Dried 1 day at 155°F and low humidity

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F31	1	11.745	19.0, 9.0 10.0, 14.7			10.350	2.3		
F32	2	12.065	14.2, 9.9, 9.2, 13.9			10.735			
F33	3	11.375	15.0, 11.5, 10.5, 18.1			9.970	2.7		
F34	4	11.965	12.7, 11.5			10.870			
F35	5	11.905	12.0, 9.8			10.525	4.1		
F36	6	12.620	14.9, 12.5			11.380			
F37	7	11.560	11.5, 11.8			10.200	1.8		
F38	8	11.090	10.0, 11.0, 15.8, 9.2			9.815			
F39	9	12.370	11.6, 7.8, 17.0, 12.2			10.000	2.1		
F40	10	11.900	13.8, 13.8			10.640			
Average:		11.860	12.1			10.509	2.6		
Std. Dev.:		0.450	3.42			0.454	0.90		

* Determined by oven drying.

Test No.: 16 Date: 3/29/69 Time: 1635
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Dried 1 day at 155°F and low humidity

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., % *	Wt, kg	Moist., %
C51	1	9.145	9.0, 9.7, 15.0, 15.8			8.010	2.8		
C52	2	9.680	10.0, 11.5			8.795			
C53	3	9.865	13.8, 14.0			8.750	2.7		
C54	4	10.140	10.5, 7.2, 17.2, 13.3			9.120			
C55	5	9.715	4.1, 16.8			8.840	5.3		
C56	6	9.820	14.0, 15.8			8.930			
C57	7	10.025	11.9, 7.8, 17.0, 13.7			9.035	4.2		
C58	8	9.575	10.0, 15.8			8.620			
C59	9	9.815	13.0, 14.2			8.965	4.9		
C60	10	10.520	17.0, 16.0			9.955			
Average:		9.830	13.3			8.902	4.0		
Std. Dev.:		0.362	2.83			0.482	1.2		

* Determined by oven drying.

Test No.: 16 Date: 3/29/69 Time: 1635
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Dried 1 day at 155°F and low humidity

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %*	Wt, kg	Moist., %
A51	1	9.600	12.0, 12.2			8.670	2.6		
A52	2	9.615	12.2, 8.5			8.630			
A53	3	8.740	9.2, 10.2, 14.0, 10.5			7.850	0.7		
A54	4	10.110	12.2, 12.5			9.285			
A55	5	9.730	8.5, 9.8			8.940	6.4		
A56	6	9.960	10.8, 10.5			9.070			
A57	7	9.905	12.5, 11.2			8.005	1.4		
A58	8	9.215	12.9, 11.8			8.295			
A59	9	9.215	10.8, 13.3			8.305	1.6		
A60	10	9.710	9.0, 11.8			8.745			
Average:		9.580	11.2			8.580	2.5		
Std. Dev.:		0.414	1.55			0.462	2.3		

* Determined by oven drying.

Test No.: 17 Date: 3/30/69 Time: 0840
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A101	1					9.155	9.2, 9.2		
A102	2					9.395	8.9, 8.6		
A103	3					8.820	9.0, 7.6		
A104	4					8.970	8.8, 10.2		
A105	5					8.725	8.2, 9.0		
A106	6					9.085	9.0, 7.6		
A107	7					8.825	8.7, 10.2		
A108	8					9.110	7.6, 8.0		
A109	9					9.130	9.9, 9.9		
A110	10					9.050	8.9, 9.8		
Average:						9.029	8.9		
Std. Dev.:						0.195	0.82		

Test No.: 17 Date: 3/30/69 Time: 0840
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Box dipped in Woodlife (3/28) and stored in unventilated Conditioning: chamber

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C121	1	9.780	12.8, 11.0	10.010		9.950	11.8, 10.2		
C122	2	9.850	10.4, 14.0	9.980		9.930	11.0, 12.2		
C123	3	10.150	11.8, 16.0	10.300		10.255	11.0, 9.8		
C124	4	9.770	11.8, 11.9	9.895		9.740	9.9, 12.0		
C125	5	10.495	13.8, 12.8, 19.7, 14.0	10.650		10.555	13.0, 12.8, 17.0, 14.2		
C126	6	10.165	13.8, 16.0	10.355		10.300	13.0, 13.0		
C127	7	10.315	15.0, 11.0	10.490		10.395	15.0, 11.0		
C128	8	9.945	12.2, 11.9	10.210		10.105	13.0, 11.7		
C129	9	10.285	9.5, 11.8, 15.0, 11.5	10.405		10.305	11.0, 12.0		
C130	10	10.015	11.9, 18.2, 12.0, 12.2	10.140		10.070	11.0, 12.0, 16.0, 12.2		
Average:		10.077	12.9	10.244		10.160	12.3		
Std. Dev.:		0.246	2.03			0.246	1.80		

Test No.: 18 Date: 3/30/69 Time: 0945
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Box dipped in Woodlife (3/28) and stored in unventilated chamber
 Conditioning:

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C131	1	10.540	14.0, 15.8	10.710		10.620	13.0, 13.0		
C132	2	9.860	11.0, 13.6	10.180		10.080	10.8, 13.9		
C133	3	9.700	12.2, 12.2	9.960		9.795	11.0, 11.6		
C134	4	10.070	17.0, 13.8	10.340		10.150	13.0, 11.7		
C135	5	10.230	12.2, 13.8	10.435		10.280	13.0, 11.0		
C136	6	9.255	14.2, 13.9	9.470		9.415	13.2, 13.8		
C137	7	10.165	13.0, 10.3	10.405		10.270	9.2, 9.0		
C138	8	9.500	10.9, 11.4	9.770		9.715	10.6, 10.8		
C139	9	9.985	13.0, 11.9	10.175		10.055	12.0, 10.6		
C140	10	9.760	14.0, 11.3, 19.9, 11.5	9.910		9.725	11.2, 11.0		
Average:		9.907	13.2	10.136		10.011	11.7		
Std. Dev.:		0.374	2.19	0.365		0.351	1.4		

Test No.: 18 Date: 3/30/69 Time: 0945

Shelter No.: 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior: to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A111	1					8.805	7.6, 10.2		
A112	2					9.195	15.8, 11.7		
A113	3					8.305	11.9, 7.8		
A114	4					8.775	10.2, 10.2		
A115	5					9.055	8.9, 8.6		
A116	6					9.890	10.3, 8.0, 16.0, 26.0		
A117	7					9.155	9.0, 11.0		
A118	8					8.790	9.0, 9.0		
A119	9					9.140	21.0, 9.0, 11.0, 19.0		
A120	10					8.550	10.0, 9.8		
Average:						8.966	11.7		
Std. Dev.:						0.432	4.6		

Test No.: 19 Date: 3/30/69 Time: 1405
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A121	1					8.770	11.4, 10.2		
A122	2					9.555	8.9, 8.9		
A123	3					8.430	10.1, 11.7		
A124	4					8.700	9.2, 9.0		
A125	5					8.860	10.0, 14.0		
A126	6					8.975	11.2, 11.6		
A127	7					9.065	11.2, 11.4		
A128	8					9.070	7.8, 9.6		
A129	9					8.715	12.0, 8.6		
A130	10					9.315	11.8, 12.2		
Average:						8.946	10.5		
Std. Dev.:						0.326	1.55		

Test No.: 19 Date: 3/30/69 Time: 1405
 Shelter No.: 2
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F81	1					11.915	10.2, 9.9		
F82	2					11.800	9.0, 8.6		
F83	3					12.375	11.2, 8.6		
F84	4					12.350	8.0, 8.4		
F85	5					11.830	10.8, 8.0		
F86	6					12.250	7.2, 9.2		
F87	7					12.655	10.8, 7.0		
F88	8					12.235	9.8, 7.0		
F89	9					11.140	9.0, 8.6		
F90	10					11.520	8.6, 8.0		
Average:						12.007	8.54		
Std. Dev.:						0.454	1.65		

Test No.: 20 Date: 3/30/69 Time: 1425

Shelter No.: 1

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F91	1					12.225	8.6, 7.8, 11.0		
F92	2					11.345	9.6, 13.4		
F93	3					11.475	10.4, 12.6		
F94	4					11.960	11.9, 11.9		
F95	5					11.680	11.2, 13.6		
F96	6					11.235	10.2, 7.6		
F97	7					11.875	12.0, 12.2		
F98	8					11.690	9.8, 11.4		
F99	9					11.830	12.0, 15.9		
F100	10					11.940	11.9, 13.0		
Average:						11.726	11.0		
Std. Dev.:						0.305	2.36		

Test No.: 20 Date: 3/30/69 Time: 1425
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A131	1					9.035	9.6, 11.2		
A132	2					8.820	9.8, 10.0		
A133	3					9.850	13.0, 9.8		
A134	4					9.410	11.2, 10.8		
A135	5					8.625	8.6, 10.4		
A136	6					8.790	12.4, 9.9		
A137	7					8.880	11.9, 13.0		
A138	8					9.405	9.2, 11.8		
A139	9					8.780	10.2, 11.8		
A140	10					9.350	9.6, 14.2		
Average:						9.195	10.9		
Std. Dev.:						0.384	1.47		

Test No.: 21 Date: 4/7/69 Time: 0933
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Coated with intumescent latex paint (flame shield 76) on 3/30 Conditioning:

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C151a	1	9.250	11.9, 13.8			9.130	8.7, 8.9	9.065	9.4, 9.8
C152a	2	9.710	13.0, 17.0			9.495	8.6, 8.0	9.435	9.3, 9.0
C153a	3	9.610	13.0, 12.4			9.340	8.3, 8.6	9.315	8.9, 9.2
C154a	4	9.210	13.0, 14.2			9.020	9.0, 9.0	8.990	8.9, 9.0
C155a	5	10.080	12.9, 10.6			9.875	10.0, 8.6	9.845	10.0, 8.0
C156a	6	10.045	13.8, 12.0			9.925	9.4, 8.6	9.895	9.9, 8.9
C157a	7	9.465	11.0, 15.8			9.240	8.0, 9.8	9.205	8.0, 9.8
C158a	8	9.075	13.8, 12.0			8.840	8.6, 8.0	8.800	8.7, 8.5
C159a	9	10.063	15.8, 15.8			9.855	10.2, 8.6	9.645	11.0, 8.7
C160a	10	9.385	14.2, 12.0			9.190	8.9, 8.9	9.060	9.5, 8.0
Average:		9.590	13.4			9.391	8.8	9.326	9.1
Std. Dev.:		0.376	1.71			0.383	0.62	0.373	0.75

Test No.: 21 Date: 4/7/69 Time: 0933

Shelter No.: 2

Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C241	1					8.970	11.0, 11.8		
C242	2					9.085	11.0, 12.0		
C243	3					8.920	14.3, 11.0		
C244	4					9.270	11.7, 14.0		
C245	5					9.085	11.8, 11.0		
C246	6					9.680	13.0, 13.0		
C247	7					9.625	11.0, 11.6		
C248	8					9.865	10.6, 12.8		
C249	9					9.350	11.0, 10.0		
C250	10					9.605	12.3, 12.3		
Average:						9.436	11.9		
Std. Dev.:						0.332	1.12		

Test No.: 22 Date: 4/7/69 Time: 1102

Shelter No.: 1

Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist., %	After burning Wt, kg Moist., %
A181	1			9.035 8.6, 8.8	
A182	2			8.565 8.0, 8.3	
A183	3			9.440 8.3, 8.7	
A184	4			8.545 8.6, 7.8	
A185	5			8.490 8.8, 7.0	
A186	6			9.800 10.4, 9.6	
A187	7			8.835 10.1, 9.4	
A188	8			8.620 9.7, 9.0	
A189	9			9.475 10.0, 10.2	
A190	10			9.020 9.8, 9.6	
Average: Std. Dev.:				8.983 9.0 0.457 0.90	

Test No.: 22 Date: 4/7/69 Time: 1102
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Coated with intumescent solvent type paint, flame shield 38 (3/30)

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A141	1	9.470	10.6, 11.4			9.380	9.0, 9.2		
A142	2	10.035	9.0, 11.6			9.940	7.6, 9.8		
A143	3	8.755	9.6, 10.4			8.710	7.1, 7.2		
A144	4	10.010	11.0, 9.4			10.005	9.7, 9.0		
A145	5	8.990	10.0, 9.2			8.890	8.6, 8.6		
A146	6	9.020	8.9, 8.9			9.045	5.0, 7.0		
A147	7	9.100	11.6, 10.2			9.105	9.2, 8.2		
A148	8	10.165	11.9, 12.4			10.085	8.8, 9.6		
A149	9	9.150	13.0, 11.8			9.050	9.0, 11.4		
A150	10	8.525	10.9, 8.6			8.900	8.1, 5.0		
Average:		9.362	10.5			9.311	8.4		
Std. Dev.:		0.523	1.30			0.513	1.55		

Test No.: 23 Date: 4/7/69 Time: 1317
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C251	1					9.305	10.4, 9.2		
C252	2					9.925	12.1, 13.9		
C253	3					9.330	12.1, 14.0		
C254	4					9.800	11.7, 12.2		
C255	5					8.850	10.2, 13.0		
C256	6					9.580	11.0, 12.0		
C257	7					9.810	12.2, 11.9		
C258	8					9.075	10.6, 11.9		
C259	9					9.005	13.0, 11.6		
C260	10					9.665	12.0, 10.8		
Average:						9.434	11.8		
Std. Dev.:						0.376	1.20		

Test No.: 23 Date: 4/7/69 Time: 1317

Shelter No.: 2

Type of boxes: Code: C Description: Untreated spruce Conditioning: Sprayed with TCP in hexane

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
Cl61a	1	10.070	10.8, 13.4			10.120	11.0, 13.0		
Cl62a	2	9.410	11.0, 8.0			9.585	11.0, 10.9		
Cl63a	3	10.260	11.2, 13.0			10.300	11.6, 12.6		
Cl64a	4	9.650	12.0, 11.0			9.725	12.1, 10.1		
Cl65a	5	9.720	13.0, 11.0			9.800	13.8, 12.9		
Cl66a	6	9.160	11.0, 11.8			9.200	10.2, 12.1		
Cl67a	7	9.325	10.8, 12.0			9.475	12.0, 12.2		
Cl68a	8	9.260	11.0, 12.8			9.380	11.6, 12.0		
Cl69a	9	9.060	10.5, 12.5			9.215	12.0, 10.6		
Cl70a	10	10.060	11.5, 15.0			10.150	10.8, 12.0		
Average:		9.598	11.7			9.695	11.7		
Std. Dev.:		0.421	1.43			0.394	1.01		

Test No.: 24 Date: 4/7/69 Time: 1345
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute Woodtox dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C171	1	9.095	10.0, 12.0	9.430		9.245	9.0, 11.8		
C172	2	9.320	10.2, 11.6	9.610		9.450	11.0, 11.8		
C181	3	8.905	7.8, 10.2	9.370		9.290	8.1, 9.6		
C182	4	9.195	9.1, 11.9	9.520		9.410	8.7, 11.0		
C183	5	9.260	8.9, 12.0	9.655		9.490	9.4, 11.9		
C184	6	9.375	10.0, 11.6	9.820		9.650	11.0, 12.2		
C185	7	9.540	10.0, 11.8	9.855		9.625	10.4, 10.4		
C180	8	9.445	11.3, 15.0	9.725		9.610	11.0, 12.0		
C189	9	9.500	9.8, 11.0	9.780		9.645	11.0, 10.2		
C190	10	10.140	10.2, 13.7	10.430		10.305	9.6, 11.9		
Average:		9.278	10.9	9.720		9.572	10.6		
Std. Dev.:		0.485	1.55	0.298		0.303	1.21		

Test No.: 24 Date: 4/7/69 Time: 1345
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C261						8.880	9.0, 13.0		
C262						10.100	14.1, 14.1		
C263						10.300	13.0, 12.0		
C264						9.300	12.0, 13.0		
C265						9.030	11.0, 14.1		
C266						10.110	12.2, 10.2		
C267						9.190	11.9, 10.2		
C268						9.340	13.6, 13.0		
C269						9.005	12.0, 11.8		
C270						10.020	10.6, 13.0		
Average:						9.527	12.2		
Std. Dev.:						0.542	1.43		

Test No.: 25 Date: 4/7/69 Time: 1435
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute Woodlife dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C161	1	9.155	8.3, 9.0	9.480		9.350	8.6, 9.2		
C162	2	9.410	8.2, 7.9	9.720		9.625	7.6, 8.2		
C163	3	9.380	10.4, 9.0	9.710		9.590	9.5, 9.8		
C164	4	9.585	10.3, 11.0	9.925		9.775	10.2, 11.2		
C165	5	9.380	9.3, 9.6	9.685		9.550	9.1, 9.6		
C166	6	9.240	9.6, 9.6	9.630		9.460	9.9, 13.0		
C167	7	9.090	10.0, 14.0	9.405		9.245	10.8, 11.8		
C168	8	9.005	8.9, 10.2	9.330		9.210	9.0, 9.0		
C169	9	9.665	10.2, 9.8	9.965		9.805	9.5, 12.0		
C170	10	9.025	9.8, 17.0, 8.6, 11.0	9.435		9.280	10.0, 11.9		
Average:		9.294	10.1	9.629		9.489	10.1		
Std. Dev.:		0.229	2.00	0.215		0.215	1.40		

Test No.: 25 Date: 4/7/69 Time: 1435
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute Woodtox dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C191	1	9.050	10.0, 12.1	9.405		9.240	9.5, 10.6		
C192	2	9.210	10.0, 10.0	9.485		9.365	9.5, 10.1		
C193	3	9.710	9.8, 14.0	9.995		9.845	9.5, 12.1		
C194	4	9.540	9.8, 9.8, 15.0, 14.0	9.825		9.680	9.0, 10.8		
C195	5	9.180	11.6, 14.0	9.480		9.345	10.5, 10.0		
C196	6	9.410	7.8, 10.0	9.710		9.610	7.2, 9.7		
C197	7	9.245	7.2, 7.2	9.580		9.415	7.5, 8.0		
C198	8	9.435	8.2, 7.6	9.690		9.580	8.2, 8.0		
C199	9	9.425	11.0, 10.6	9.760		9.590	10.1, 13.8		
C200	10	9.680	10.4, 13.0	10.010		9.865	10.0, 10.8		
Average:		9.388	10.6	9.658		9.554	9.7		
Std. Dev.:		0.217	2.31	0.283		0.211	1.54		

Test No.: 26 Date: 4/7/69 Time: 1553
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C271	1					9.685	12.2, 12.1		
C272	2					9.540	11.0, 13.8		
C273	3					9.000	12.2, 14.2		
C274	4					9.730	12.2, 16.0		
C275	5					9.785	11.8, 12.0		
C276	6					10.050	14.0, 13.0		
C277	7					9.940	13.2, 15.7		
C278	8					8.945	10.4, 11.8		
C279	9					9.390	11.7, 12.2		
C280	10					9.580	12.0, 8.9		
Average:						9.564	12.5		
Std. Dev.:						0.365	1.66		

Test No.: 26 Date: 4/7/69 Time: 1553
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute Woodlife dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C173	1	8.805	10.0, 13.8	9.115		8.945	11.0, 13.0		
C174	2	9.280	9.2, 10.0	9.610		9.465	9.8, 9.5		
C175	3	9.010	9.2, 9.2	9.710		9.475	9.5, 13.9		
C176	4	9.415	11.0, 14.0	9.710		9.505	10.0, 13.0		
C177	5	9.385	11.0, 11.2	9.795		9.440	7.5, 8.5		
C178	6	8.785	9.6, 11.7	9.175		8.935	9.9, 11.9		
C179	7	9.595	11.7, 12.1	10.045		9.835	12.0, 11.0		
C186	8	9.550	8.6, 13.0	9.910		9.770	8.5, 9.8		
C187	9	9.550	10.8, 9.6	9.850		9.710	11.0, 10.2		
C188	10	9.140	9.2, 11.8	9.515		9.350	9.5, 10.5		
Average:		9.252	10.8	9.643		9.443	10.6		
Std. Dev.:		0.304	1.59	0.302		0.308	1.66		

Test No.: 27 Date: 4/7/69 Time: 1619
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute dip in Woodtox

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist. %	After burning Wt, kg Moist., %
C201	1			9.835 10.0, 10.2	
C202	2			10.130 9.5, 11.0	
C203	3			10.000 10.8, 11.6	
C204	4			9.735 10.0, 11.0	
C205	5			9.660 10.4, 12.1	
C206	6			9.630 10.8, 12.0	
C207	7			9.340 9.0, 9.9	
C208	8			9.510 10.0, 10.0	
C209	9			9.485 11.0, 11.2	
C210	10			9.795 10.0, 11.0	
Average: Std. Dev.:				9.712 10.6 0.240 0.81	

Test No.: 27 Date: 4/7/65 Time: 1619
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute dip in Woodtox with TCP

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C221	1	9.765	11.9, 11.0	10.130		9.990	10.3, 11.7		
C222	2	9.925	11.7, 12.1	10.280		10.170	10.4, 10.8		
C223	3	9.340	12.2, 11.0	9.685		9.560	11.9, 11.0		
C224	4	8.980	11.0, 10.6	9.300		9.170	11.4, 11.8		
C225	5	9.010	10.6, 10.6	9.400		9.250	10.0, 12.0		
C226	6	9.545	12.2, 11.0, 18.0, 12.0	9.930		9.790	11.8, 13.7		
C227	7	9.110	9.6, 9.6, 20.0, 16.0	9.545		9.345	8.5, 16.5		
C228	8	9.270	12.0, 15.0	9.620		9.465	10.2, 13.0		
C229	9	8.990	11.0, 11.8	9.405		9.240	11.7, 13.9		
C230	10	8.745	10.8, 13.9	9.080		8.910	11.0, 12.1		
Average:		9.268	12.3	9.638		9.489	11.7		
Std. Dev.:		0.377	2.56	0.378		0.393	1.68		

Test No.: 28 Date: 4/8/69 Time: 0936
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute dip in Woodtox with TCP

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C231	1	9.195	11.7, 14.2	9.585		9.430	10.0, 13.8		
C232	2	9.030	14.0, 14.2	9.445		9.265	13.0, 12.0		
C233	3	9.265	12.1, 13.2 20.0, 14.0	9.655		9.435	10.4, 12.1		
C234	4	9.895	12.2, 13.0	10.280		10.115	11.6, 13.0		
C235	5	9.625	13.0, 17.0	9.965		9.785	9.5, 11.0		
C236	6	10.145	12.0, 15.0	10.510		10.295	11.0, 13.0		
C237	7	9.635	15.0, 16.0	10.020		9.820	12.0, 13.8		
C238	8	9.765	13.0, 13.2	10.105		9.985	9.5, 10.2		
C239	9	9.610	14.6, 13.0	9.960		9.790	12.4, 9.8		
C240	10	10.130	13.0, 16.1	10.470		10.265	10.2, 12.0		
Average:		9.630	14.1	10.000		9.818	11.5		
Std. Dev.:		0.378	1.93	0.361		0.357	1.40		

Test No.: 28 Date: 4/8/69 Time: 0936
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Three-minute Woodtox dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C211	1	9.535	9.0, 9.6	9.810		9.630	9.0, 9.5		
C212	2	9.240	9.0, 9.7	9.585		9.450	8.5, 9.0		
C213	3	9.390	10.1, 11.0	9.735		9.530	9.2, 11.0		
C214	4	9.800	11.8, 10.0	10.110		9.960	10.1, 12.0		
C215	5	9.750	10.1, 11.6	10.045		9.880	10.0, 11.0		
C216	6	9.510	12.0, 10.0	9.950		9.805	9.5, 11.0		
C217	7	9.605	11.0, 12.0	9.790		9.615	9.5, 11.0		
C218	8	9.065	12.0, 12.0	9.435		9.205	11.0, 11.6		
C219	9	9.335	11.2, 13.0	9.640		9.440	11.0, 11.8		
C220	10	9.185	10.0, 10.0	9.545		9.340	10.0, 10.0		
Average:		9.442	10.8	9.764		9.586	10.3		
Std. Dev.:		0.242	1.15	0.221		0.242	1.02		

Test No.: 29 Date: 4/8/69 Time: 1106
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F121	1					11.660	11.0, 11.2		
F122	2					11.580	9.7, 9.2		
F123	3					11.525	9.8, 10.1		
F124	4					11.045	9.2, 11.0		
F125	5					11.550	10.8, 11.9		
F126	6					11.830	8.5, 9.0		
F127	7					11.930	9.5, 10.0		
F128	8					11.885	9.0, 10.9		
F129	9					11.595	9.2, 7.0		
F130	10					11.710	9.5, 9.5		
Average:						11.631	9.8		
Std. Dev.:						0.251	1.12		

Test No.: 29 Date: 4/8/69 Time: 1106

Shelter No.: 2

Type of boxes: Code: F Description: Treated southern yellow pine Conditioned: Sprayed with TCP in percholoroethylene

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F101	1	12.320		12.410		12.350	11.7, 11.9		
F102	2	13.035		13.135		13.090	10.8, 9.5		
F103	3	12.495		12.585		12.485	9.5, 11.7		
F104	4	11.615		11.745		11.675	10.8, 12.0		
F105	5	11.920		12.010		11.970	9.5, 10.4		
F106	6	11.550		11.660		11.585	10.2, 11.4		
F107	7	-		-		12.165	9.8, 7.5		
F108	8	-		-		11.950	11.0, 10.8		
F109	9	-		-		11.070	11.0, 10.0		
F110	10	-		-		10.640	11.0, 11.8		
Average:		12.156		12.258		11.898	10.6		
Std. Dev.:		0.571		0.562		0.704	1.1		

Test No.: 30 Date: 4/8/69 Time: 1335

Shelter No.: 1

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Sprayed with TCP in perchloroethylene

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F111	1	12.005		12.120		11.900	13.9, 12.4		
F112	2					11.005	10.8, 11.8		
F113	3	11.810		11.910		11.810	11.8, 11.0		
F114	4	11.700		11.820		11.780	10.1, 11.0		
F115	5	11.630		11.765		11.645	11.0, 11.9		
F116	6	10.980		11.135		11.040	10.8, 12.1		
F117	7	11.180		11.285		11.150	12.0, 11.0		
F118	8	11.790		11.935		11.850	9.8, 12.0		
F119	9	11.730		11.830		11.715	12.7, 12.2		
F120	10	11.670		11.770		11.710	10.0, 9.5		
Average:		11.611		11.730		11.560	11.4		
Std. Dev.:		0.324		0.316		0.351	1.09		

Test No.: 30 Date: 4/8/69 Time: 1335
 Shelter No.: 2
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F131	1					11.725	10.1, 8.2		
F132	2					12.405	10.0, 8.5		
F133	3					12.090	10.8, 8.0		
F134	4					12.555	9.2, 10.2		
F135	5					11.645	10.8, 9.0		
F136	6					11.950	9.8, 10.1		
F137	7					12.375	11.0, 8.2		
F138	8					12.500	11.0, 9.5		
F139	9					12.405	11.9, 11.0		
F140	10					12.055	11.0, 7.5		
Average:						12.170	9.8		
Std. Dev.:						0.325	1.24		

Test No.: 31 Date: 4/8/69 Time: 1411
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A211	1					8.700	7.2, 8.5		
A212	2					8.310	10.2, 11.0		
A213	3					8.760	9.2, 6.5		
A214	4					8.975	9.3, 9.8		
A215	5					8.205	8.8, 9.3		
A216	6					8.050	9.2, 10.0		
A217	7					8.480	9.9, 10.0		
A218	8					8.310	8.1, 9.0		
A219	9					8.975	11.1, 11.3		
A220	10					8.735	8.5, 9.1		
Average:						8.550	9.3		
Std. Dev.:						0.325	1.21		

Test No.: 31 Date: 4/8/69 Time: 1411
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioned: Sprayed with TCP in perchloroethylene

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A191	1	9.765	10.2, 9.5	9.880		9.845	11.5, 9.1		
A192	2	9.010	9.9, 8.9	9.090		9.065	9.5, 9.6		
A193	3	10.325	11.0, 9.9	10.425		10.385	11.6, 11.7		
A194	4	10.425	11.0, 11.9	10.515		10.480	13.5, 10.3, 7.7, 11.2		
A195	5	9.615	9.0, 9.5	9.720		9.580	9.6, 9.9		
A196	6	8.995	10.2, 11.8	9.080		9.025	10.6, 11.5		
A197	7	9.230	8.5, 11.0	9.430		9.290	10.2, 11.4		
A198	8	8.860	9.9, 10.6	8.975		8.945	10.6, 10.8		
A199	9	8.635	8.2, 11.0	8.765		8.670	8.9, 10.3		
A200	10	8.180	9.1, 8.9	8.315		8.265	8.5, 9.2		
Average:		9.304	10.0	9.420		9.355	10.3		
Std. Dev.:		0.723	1.07	0.714		0.718	1.30		

Test No.: 32 Date: 4/8/69 Time: 1500
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Condition: Sprayed with TCP in perchloroethylene

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A201	1	8.715	9.5, 8.9	8.845		8.795	10.2, 9.7		
A202	2	9.210	9.2, 8.0	9.275		9.245	8.5, 11.0		
A203	3	8.550	9.5, 9.2	8.645		8.615	9.5, 10.0		
A204	4	8.665	7.5, 8.5	8.795		8.760	9.1, 9.5		
A205	5	9.065	10.0, 9.5	9.200		9.135	7.8, 10.0		
A206	6	9.220	10.1, 9.5	9.315		9.270	10.7, 12.0		
A207	7	9.455	8.5, 9.3	9.530		9.500	10.0, 10.0		
A208	8	8.615	9.5, 12.0	8.705		8.675	10.0, 9.5		
A209	9	9.170	8.9, 8.5	9.280		9.235	9.5, 9.5		
A210	10	8.885	8.1, 8.2	9.005		8.970	7.5, 9.0		
Average:		8.955	9.1	9.060		9.020	9.7		
Std. Dev.:		0.311	0.98	0.301		0.299	1.02		

Test No.: 32 Date: 4/8/69 Time: 1500

Shelter No.: 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A221	1					9.190	11.0, 9.0		
A222	2					8.405	8.2, 8.9		
A223	3					8.690	8.5, 9.5		
A224	4					9.565	9.9, 11.8		
A225	5					8.915	8.9, 9.0		
A226	6					9.085	9.3, 11.9		
A227	7					9.230	9.1, 9.5		
A228	8					8.370	9.9, 9.2		
A229	9					8.875	9.5, 10.0		
A230	10					8.810	9.9, 9.8		
Average:						8.914	9.6		
Std. Dev.:						0.372	0.97		

Test No.: 33 Date: 4/8/69 Time: 1521
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A231	1					9.030	9.8, 8.5		
A232	2					8.835	9.8, 11.8		
A233	3					8.815	11.8, 9.0		
A234	4					8.430	10.0, 9.5		
A235	5					9.095	9.5, 11.0		
A236	6					8.905	8.5, 10.7		
A237	7					9.465	9.0, 10.0		
A238	8					8.760	11.0, 14.2		
A239	9					9.585	8.0, 8.0		
A240	10					8.925	7.5, 9.0		
Average:						8.984	9.8		
Std. Dev.:						0.337	1.60		

Test No.: 33 Date: 4/8/69 Time: 1521

Shelter No.: 2

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Three-minute Woodlife dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F141	1	12.560	9.5, 9.0	12.810		12.665	10.4, 9.8		
F142	2	11.815	7.5, 11.0	12.040		11.965	10.0, 11.0		
F143	3	12.405	10.0, 8.0	12.670		12.540	1 6, 9.5		
F144	4	12.035	9.5, 8.9	12.315		12.200	8.0, 10.0		
F145	5	12.865	9.5, 9.0, 14.0, 11.0	13.100		12.960	10.4, 13.6		
F146	6	12.980	8.0, 9.0	13.265		13.170	10.0, 8.0		
F147	7	12.200	8.5, 11.0	12.455		12.300	9.8, 10.2		
F148	8	11.075	10.0, 11.0	11.335		11.230	12.0, 11.8		
F149	9	11.970	11.0, 10.2	12.220		12.080	11.5, 10.2		
F150	10	11.845	11.8, 9.0	12.110		11.990	11.2, 12.2		
Average:		12.175	9.8	12.432		12.310	10.6		
Std. Dev.:		0.561	1.48	0.564		0.557	1.35		

Test No.: 34 Date: 4/8/69 Time: 1615
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Three-minute Woodlife dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F151	1	11.545	8.5, 9.6	11.850		11.680	13.0, 12.9		
F152	2	12.880	11.8, 8.0	13.120		13.025	12.9, 9.1		
F153	3	12.565	9.5, 9.5	12.775		12.635	11.9, 12.8		
F154	4	12.515	10.0, 13.0	12.770		12.650	11.8, 12.8		
F155	5	12.155	10.2, 11.0	12.410		12.270	12.2, 12.4		
F156	6	11.955	11.0, 10.0	12.210		12.115	12.2, 12.0		
F157	7	12.325	8.9, 9.4	12.575		12.410	10.4, 13.0		
F158	8	12.330	11.0, 8.5	12.585		12.460	11.8, 11.6		
F159	9	12.195	9.9, 8.0	12.405		12.265	11.5, 9.8		
F160	10	12.090	11.0, 9.0, 8.9	12.335		12.230	11.1, 13.5		
Average: Std. Dev.:		12.256 0.365	9.8 1.28	12.504 0.349		12.374 0.360	11.9 1.13		

Test No.: 34 Date: 4/8/69 Time: 1615
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: As received

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A241	1								
A242	2						7.2, 7.8		
A243	3						8.8, 9.7		
A244	4						8.2, 10.1		
A245	5						8.6, 10.1		
A246	6						7.3, 8.2, 12.1, 11.1		
A247	7						9.9, 9.8		
A248	8						8.8, 10.2		
A249	9						7.5, 10.4, 12.2		
A250	10						9.3, 12.9		
							10.3, 14.0		
Average:							9.9		
Std. Dev.:							1.81		

Test No.: 35 Date: 4/10/69 Time: 0934
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist., %	After burning Wt, kg Moist., %
F181	1			12.545 12.0, 15.0	12.355 10.0, 14.0
F182	2			11.580 12.0, 15.0	11.400 13.0, 15.0
F183	3			12.340 18.0, 12.0, 13.0, 19.0	12.285 18.0, 18.0
F184	4			11.235 12.0, 12.0	11.215 13.0, 15.0
F185	5			11.680 14.0, 12.0	11.660 13.0, 12.0
F186	6			12.380 16.0, 15.0	12.343 16.0, 17.7
F187	7			11.875 12.0, 13.0	11.755 12.0, 14.0
F188	8			11.810 16.0, 17.8	11.785 14.0, 14.0
F189	9			11.545 16.0, 14.0	11.515 18.0, 14.0
F190	10			11.210 12.0, 15.0	11.200 11.0, 12.0
Average: Std. Dev.:				11.820 14.2 0.469 2.2	11.751 14.2 0.445 2.4

Test No.: 35 Date: 4/9/69 Time: 0934
 Shelter No.: 2
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Three-minute Woodtox dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
F161	1	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F162	2	11.460	10.2, 11.7	11.750	11.0, 12.0	11.575	11.0, 12.0	11.430	10.0, 12.0
F163	3	11.530	9.1, 13.7	11.900	9.0, 10.0	11.765	9.0, 10.0	11.640	10.0, 10.0
F164	4	10.860	9.9, 10.0	11.170	14.0, 10.0	11.015	14.0, 10.0	10.985	10.0, 13.0
F165	5	11.030	9.5, 9.5	11.405	10.0, 9.0	11.275	10.0, 9.0	11.255	9.5, 11.2
F166	6	11.815	11.6, 13.8	12.175	10.0, 12.0	11.745	10.0, 12.0	11.745	10.0, 10.0
F167	7	12.140	13.0, 12.8	12.440	14.0, 13.0	12.275	14.0, 13.0	12.255	13.8, 13.0
F168	8	11.650	10.0, 9.0	11.900	12.0, 10.0	11.615	12.0, 10.0	11.725	11.0, 9.5
F169	9	12.090	11.0, 10.0	12.420	12.0, 11.0	12.285	12.0, 11.0	12.260	12.0, 10.0
F170	10	12.040	12.0, 12.2	12.310	13.0, 12.0	12.005	13.0, 12.0	11.865	11.0, 11.0
		12.470	12.0, 11.0	12.795	13.0, 11.0	12.635	13.0, 11.0	12.615	12.0, 11.0
Average:		11.709	11.1	12.027	11.4	11.819	11.4	11.778	11.0
Std. Dev.:		0.507	1.51	0.500	1.54	0.491	1.54	0.496	1.26

Test No.: 36 Date: 4/11/69 Time: 1108

Shelter No.: 1

Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: Three-minute Woodtox dip

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
F171	1	11.690	12.0, 11.0	11.970		11.730	12.1, 11.9	11.530	13.0, 12.0
F172	2	11.200	11.0, 12.0	11.475		11.320	10.8, 11.8	11.125	13.6, 13.7
F173	3	11.720	14.0, 15.0	12.050		11.780	13.0, 13.8	11.740	13.9, 13.0
F174	4	11.985	14.0, 11.8, 8.9, 13.8	12.305		12.115	12.1, 12.2	12.065	14.7, 9.8
F175	5	12.600	14.0, 17.0	12.835		12.590	13.0, 13.8	12.555	13.0, 13.6
F176	6	10.835	11.0, 13.8	11.115		10.960	12.0, 11.0	10.930	11.0, 10.8
F177	7	11.780	11.8, 10.0	12.030		11.845	12.0, 11.0	11.815	12.8, 11.0
F178	8	11.745	13.8, 14.0	12.020		11.860	12.2, 12.1	11.825	14.0, 12.0
F179	9	12.595	13.7, 16.0	12.840		12.485	10.6, 11.7	12.445	12.1, 10.8
F180	10	12.575	15.0, 19.0	12.890		12.535	13.0, 14.0	12.490	13.0, 15.8
Average:		11.873	13.3	12.153		11.922	12.2	11.852	12.7
Std. Dev.:		0.593	2.35	0.589		0.530	0.98	0.557	1.50

Test No.: 36 Date: 4/11/69 Time: 1108
 Shelter No.: 2
 Type of boxes: Code: F Description: Treated southern yellow pine Conditioning: As received

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist., %	After burning Wt, kg Moist., %
F191	1			11.950 15.0, 14.8	
F192	2			11.700 13.9, 14.2	
F193	3			11.620 15.8, 15.0	
F194	4			11.855 14.1, 15.0	
F195	5			11.485 14.1, 15.8	
F196	6			12.056 12.2, 11.8	
F197	7			11.960 12.0, 13.6	
F198	8			11.740 12.2, 15.0	
F199	9			12.120 11.9, 11.0	
F200	10			12.285 15.0, 16.8	
Average: Std. Dev.:				11.877 14.1 0.244 1.6	

Test No.: 37 Date: 4/13/69 Time: 0829
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Latex fire-retardant paint one coat (MS) (4/11) and dried at Conditioning: 155°F

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A301	1	9.475	10.0, 10.6			8.905	<7.0, <7.0, <7.0, <7.0		
A302	2	8.975	10.0, 10.0			8.510	7.0, 7.0		
A303	3	8.925	9.0, 10.0			8.540	7.0, 8.0, <7.0, <7.0		
A304	4	8.725	10.0, 10.0			8.305	<7.0, 7.0, <7.0, 7.0		
A305	5	9.490	12.0, 11.0			9.010	<7.0		
A306	6	9.755	15.0, 13.0			9.170	7.0, 8.0		
A307	7	9.395	13.0, 11.0			8.765	<7.0, 7.0		
A308	8	9.510	11.0, 16.0			8.455	<7.0, 13.0, 7.0, <7.0		
A309	9	9.070	13.8, 10.0			8.575	7.0, <7.0, 7.0, <7.0		
A310	10	10.000	11.0, 10.0			9.700	7.0, 7.5		
Average:		9.322	11.3			8.794	<7.0		
Std. Dev.:		0.399	1.89			0.418			

Test No.: 37 Date: 4/13/69 Time: 0829
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: White epoxy paint (4/11) and dried at 155°F

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A331	1	9.190	9.5, 9.5			8.840	7.0, 7.0		
A332	2	9.050	9.0, 11.0			8.680	7.0, 7.0		
A333	3	9.035	9.0, 9.1			8.770	7.0, 7.0		
A334	4	9.710	7.0, 11.0			8.445	7.0, 7.2		
A335	5	8.505	11.0, 11.8			8.150	7.0, 7.0		
A336	6	8.760	10.0, 9.0			8.540	7.0, 7.0		
A337	7	8.985	11.0, 10.0			8.610	7.1, <7.0, 7.0, 7.0		
A338	8	9.660	11.9			9.335	9.0, 8.0		
A339	9	8.580	9.0, 9.5			8.360	7.5, 7.0		
A340	10	9.610	12.0, 11.0			9.295	7.0, 7.0		
Average:		9.109	10.2			8.703	7.2		
Std. Dev.:		0.436	1.10			0.380	0.47		

Test No.: 38 Date: 4/13/69 Time: 0926
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Green epoxy paint (4/12) and dried at 155°F
 Conditioning: _____

Box No.	Position in pile	Before conditioning	After conditioning	Prior to burning	After burning
		Wt, kg Moist., %	Wt, kg Moist., %	Wt, kg Moist., %	Wt, kg Moist., %
A311	1	8.880 13.0, 12.0		8.415 <7.0, 7.0, 7.0, 7.0	
A312	2	8.730 10.0, 9.0, 16.0, 13.0		8.405 9.0, 9.0	
A313	3	9.260 11.0, 10.0		9.080 9.5, 8.5	
A314	4	9.345 10.0, 9.0		9.100 8.5, 7.5	
A315	5	8.920 8.0, 12.0		8.660 7.0, 7.1	
A316	6	8.845 6.5, 10.0		8.735 9.0, 9.0	
A317	7	9.265 9.0, 13.0		9.055 8.1, 11.0	
A318	8	8.995 11.0, 12.0		8.830 8.0, 10.0	
A319	9	9.040 10.0, 10.0		8.875 9.0, 10.0	
A320	10	8.780 9.0, 9.0		8.675 7.5, 10.0	
Average:		9.006 10.7		8.783 8.4	
Std. Dev.:		0.217 1.93		0.254 1.21	

Test No.: 38 Date: 4/13/69 Time: 0926
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Latex fire retardant paint (MS) (4/11) and dried at 155°F

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A291	1	8.545	9.5, 9.0			8.220	<7.0, <7.0, 7.2, <7.0		
A292	2	8.670	10.0, 9.8			8.345	<7.0, 7.0, 7.0, 8.0		
A293	3	9.515	11.0, 10.2			9.210	7.1, 7.0		
A294	4	8.710	8.0, 11.0			8.435	<7.0, <7.0, 7.5, 7.0		
A295	5	8.420	9.0, 9.5			8.200	7.0, <7.0, <7.0, <7.0		
A296	6	8.825	10.0, 10.1			8.535	7.0, <7.0, <7.0, <7.0		
A297	7	8.615	9.5, 10.0			8.320	7.0, 7.0		
A298	8	9.285	20.0, 9.0, 14.0, 13.0			8.765	7.0, 7.2		
A299	9	9.055	9.5, 12.0			8.780	7.0, 7.5		
A300	10	8.235	9.5, 10.0			7.935	7.0, 7.0		
Average:		8.788	10.6			8.475	<7		
Std. Dev.:		0.374	2.50			0.364			

Test No.: 39 Date: 4/13/69 Time: 1043
 Shelter No.: 1
 Type of boxes: Code: C Description: Untreated spruce
 Latex fire retardant paint (MS)
 Conditioning: (4/11) and dried at 155°F

Appendix B

Box No.	Position in pile	Before conditioning	After conditioning	Prior to burning	After burning
		Wt, kg Moist., %	Wt, kg Moist., %	Wt, kg Moist., %	Wt, kg Moist., %
C281	1	9.785 11.0, 9.5		9.580 7.5, 7.0	
C282	2	9.765 11.0, 10.0		9.650 8.5, 7.5	
C283	3	9.675 12.0, 10.0		9.430 11.0, <7.0, <7.0, 9.5	
C284	4	9.745 9.0, 12.0		9.600 7.1, 8.5	
C285	5	9.175 10.0, 11.8		8.820 7.5, <7.0, <7.0, <7.0	
C286	6	9.090 9.0, 10.0		8.960 8.5, 9.8	
C287	7	9.015 11.0, 15.0		8.710 <7.0, <7.0, 7.1, 7.0	
C288	8	9.460 11.0, 11.0		9.200 7.0, 10.0	
C289	9	9.320 11.0, 11.0		9.070 7.5, 10.0	
C290	10	8.940 11.0, 12.0		8.670 8.1, 7.1	
Average:		9.397 10.9		9.169 7.9	
Std. Dev.:		0.332 0.91		0.379 0.74	

Test No.: 39 Date: 4/13/69 Time: 1043
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Water sprayed

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A251	1					10.555	15.0, 13.0, 21.0, 15.0		
A252	2					9.995	15.0, 11.8, 19.0, 24.0		
A253	3					9.095	13.0, 9.5		
A254	4					9.035	15.0, 14.1		
A255	5					9.555	19.0, 16.1		
A256	6					9.140	13.0, 9.8, 22.0, 15.0		
A257	7					9.055	10.0, 13.0		
A258	8					8.875	16.0, 18.0		
A259	9					9.955	14.0, 11.0		
A260	10					9.720	12.8, 11.9		
Average:						9.500	14.9		
Std. Dev.:						0.549	3.74		

Test No.: 40 Date: 4/13/69 Time: 1206

Shelter No.: 1

Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Water sprayed

Box No.	Position in pile	Before conditioning Wt, kg Moist., %	After conditioning Wt, kg Moist., %	Prior to burning Wt, kg Moist., %	After burning Wt, kg Moist., %
A261	1			8.865 10.8, 10.9	
A262	2			8.385 10.0, 9.8	
A263	3			8.795 10.1, 9.5	
A264	4			9.725 16.0, 14.0	
A265	5			9.315 10.0, 10.8	
A266	6			9.155 11.9, 13.0	
A267	7			9.715 11.7, 11.9	
A268	8			9.275 13.2, 11.7	
A269	9			9.000 11.9, 10.2	
A270	10			9.265 8.5, 9.2	
Average: Std. Dev.:				9.150 11.3 0.411 1.80	

Test No.: 40 Date: 4/13/69 Time: 1206
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Latex fire retardant paint (MS) (4/11) and dried at 155°F

Box No.	Position in pile	Before conditioning	After conditioning	Prior to burning	After burning
C291	1	Wt, kg 9.135 Moist., % 11.6, 13.8	Wt, kg Moist., %	Wt, kg 2.660 Moist., % 7.1, <7.0, <7.0, <7.0	Wt, kg Moist., %
C292	2	8.810 10.0, 8.0, 15.8, 10.0		8.525 7.1, <7.0, <7.0, <7.0	
C293	3	9.615 12.0, 12.0		9.315 <7.0, <7.0, 9.5, 8.5	
C294	4	9.465 12.0, 12.0		9.135 9.1, 7.5	
C295	5	9.185 10.0, 13.8		8.760 <7.0, <7.0, <7.0, <7.0	
C296	6	8.910 11.0, 10.0		8.480 <7.0, <7.0, <7.0, <7.0	
C297	7	9.320 12.0, 13.0		8.890 8.0, 7.1	
C298	8	9.535 10.0, 14.0		9.095 7.8, <7.0, <7.0, <7.0	
C299	9	9.210 9.5, 9.5		8.825 <7.0, <7.0, <7.0, <7.0	
C300	10	9.110 10.0, 11.0		8.640 <7.0, <7.0, <7.0, <7.0	
Average:		9.230 11.5		8.833 7.0, <7.0, ~7.0	
Std. Dev.:		0.260 1.04		0.276	

Test No.: 41 Date: 4/28/69 Time: 1040-1115

Shelter No.: 1

Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Two coats MIL-P-52024B paint

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A271	1	8.330	7.1, 7.5	8.955	8.5, 8.0	9.080	7.5, 8.0	8.835	8.0, 8.1
A272	2	9.125	7.2, 8.4	9.255	7.1, 8.0	9.335	8.0, 8.7	9.145	8.9, 8.9
A273	3	9.000	7.0, 8.3	9.120	7.5, 8.5	9.205	7.6, 8.0	9.095	7.8, 9.9
A274	4	9.270	7.1, 8.5	9.385	8.0, 7.5	9.465	8.5, 7.7	9.400	8.5, 8.0
A275	5	8.370	7.0, 7.5	8.485	7.5, 7.2	8.575	7.5, 7.5	8.565	8.0, 7.8
A276	6	8.685	8.0, 8.0	8.780	8.0, 8.9	8.855	8.3, 9.0	8.775	9.0, 9.5
A277	7	9.040	8.2, 8.2	9.175	8.9, 8.9	9.295	8.7, 8.5	9.285	9.1, 9.1
A278	8	8.825	7.0, 7.5	8.970	7.5, 8.2	9.085	8.0, 8.3	9.080	8.1, 8.8
A279	9	9.065	7.8, 7.6	9.175	7.9, 8.5	9.255	8.0, 8.0	9.250	8.6, 8.1
A280	10	9.530	7.5, 7.2	9.635	7.5, 7.2	9.745	8.0, 8.7	9.730	8.1, 8.0
Average:		8.974	7.6	9.094	8.0	9.190	8.1	9.116	8.5
Std. Dev.:		±0.320	±0.5	±0.320	±0.6	±0.322	±0.4	±0.334	±0.6

Test No.: 41 Date: 4/29/69 Time: 1040-1115
 Shelter No.: 2
 Type of boxes: Code: FR Description: Treated southern yellow pine (reused) Conditioning: Moistened by water spraying

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
FR1	1					12.020	15.0, 15.0	11.810	15.0, 19.0
FR2	2					12.855	16.0, 16.7	12.855	15.0, 15.7
FR3	3					11.201	16.0, 16.7	11.030	14.0, 14.0
FR4	4					12.220	17.8, 13.5	12.135	15.7, 15.7
FR5	5					12.810	17.0, 16.0	12.735	16.0, 15.0
FR6	6					11.855	16.0, 15.2	11.780	14.7, 13.8
FR7	7					11.725	16.0, 16.8	11.630	15.0, 14.0
FR8	8					11.245	16.7, 17.1	11.180	15.0, 16.0
FR9	9					11.535	17.0, 18.1	11.440	15.0, 18.0
FR10	10					11.795	17.0, 17.5	11.700	15.0, 16.0
Average:						11.926	16.4	11.827	15.4
Std. Dev.:						±0.572	±1.1	±0.604	±1.3

Test No.: 42 Date: 4/29/69 Time: 1534-1400
 Shelter No.: 1
 Type of boxes: Code: F Description: Treated southern yellow pine (reused) Conditioning: Moistened by water spraying

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt., kg	Moist., %	Wt., kg	Moist., %	Wt., kg	Moist., %	Wt., kg	Moist., %
FR11	1					11.215	17.8, 18.2		
FR12	2					12.630	18.0, 13.8		
FR13	3					11.170	19.0, 12.0		
FR14	4					12.670	17.8, 19.0		
FR15	5					12.650	19.8, 20.0		
FR16	6					11.825	17.4, 17.9		
FR17	7					11.520	17.8, 17.0		
FR18	8					13.085	19.0, 16.8		
FR19	9					12.035	17.8, 18.0		
FR20	10					12.510	20.0, 18.0, 25.0, 19.0		
Average:						12.131	18.4		
Std. Dev.:						±0.675	±2.0		

Test No.: 42 Date: 4/29/69 Time: 1334-1400

Shelter No.: 2

Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: Two coats MIL-P-52024B paint

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A281	1	8.535	8.0, 8.0	8.650	8.5, 7.9	8.730	8.5, 8.9	8.605	9.5, 9.8
A282	2	8.830	8.2, 8.8	8.930	8.1, 8.0	9.000	8.7, 9.1	8.895	10.0, 8.7
A283	3	9.440	8.3, 8.3	9.525	8.0, 8.0	9.620	8.5, 8.4	9.590	8.9, 8.6
A284	4	8.650	7.8, 8.6	8.765	7.5, <7.0	8.885	7.9, 8.5	8.875	8.2, 7.0
A285	5	8.490	8.0, 7.5	8.665	8.2, 9.0	8.745	8.6, 9.0	8.730	8.5, 8.5
A286	6	8.945	7.7, 8.5	9.025	7.5, 8.2	9.125	7.5, 9.0	9.125	8.1, 8.0
A287	7	8.410	8.6, 8.0	8.525	8.5, 7.0	8.640	8.8, 7.5	8.635	9.5, 7.8
A288	8	8.745	8.4, 7.8	8.865	7.0, 8.0	8.960	8.7, 8.1	8.955	7.0, 9.1
A289	9	8.500	8.3, 8.1	8.625	9.0, 8.0	8.740	8.5, 9.0	8.720	8.9, 8.9
A290	10	8.530	8.5, 8.5	8.625	8.0, 7.0	8.735	9.0, 8.5	8.725	9.5, 9.1
Average:		8.708	8.2	8.820	7.9	8.918	8.5	8.885	8.7
Std. Dev.:		± 0.308	± 0.3	± 0.293	± 0.6	± 0.289	± 0.5	± 0.294	± 0.8

Test No.: 43 Date: 5/5/69 Time: 1300
 Shelter No.: 1
 Type of boxes: Code: A Description: Shook-treated ponderosa pine boxes Conditioning: One coat MIL-P-52024B paint applied

Appendix B

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A351	1	9.190	8.3, <7.0, 8.3, 8.3			9.310	8.2, 8.6		
A352	2	8.835	7.5, 8.5			8.940	7.6, 8.1		
A353	3	8.710	7.5, 9.0			8.820	7.9, 7.1		
A354	4	8.330	8.2, 8.2			8.425	8.0, 7.7		
A355	5	9.300	9.0, 7.2			9.435	8.8, 8.2		
A356	6	8.870	8.5, 10.8			8.930	8.4, 9.7		
A357	7	10.255	11.6, 11.7			10.215	9.8, 9.3		
A358	8	8.575	7.7, 12.0			8.590	7.0, 9.0		
A359	9	9.795	10.0, 11.5			9.795	9.2, 9.8		
A360	10	8.880	9.6, 9.8			8.935	8.0, 8.6		
Average:		9.074	9.10			9.139	8.45		
Std. Dev.:		0.582	1.56			0.552	0.83		

Test No.: 43 Date: 5/5/69 Time: 1315
 Shelter No.: 2
 Type of boxes: Code: A Description: Shook-treated ponderosa pine Conditioning: One coat MIL-P-52024B paint applied (4/29)

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
A361	1	9.390	11.0, 10.3			9.470	10.1, 10.0		
A362	2	9.460	9.5, 10.8			9.485	8.9, 10.2		
A363	3	9.050	10.0, 9.5			9.115	9.0, 8.2		
A364	4	9.005	10.5, 12.8			9.070	9.7, 10.8		
A365	5	9.035	11.5, 10.8			9.120	10.3, 9.2		
A366	6	8.895	10.6, 10.0			8.950	10.0, 8.1		
A367	7	8.915	10.8, 10.6			8.940	9.0, 9.7		
A368	8	9.455	11.2, 11.7			9.490	9.0, 10.0		
A369	9	8.845	12.0, 10.3			8.940	11.0, 9.8		
A370	10	10.355	12.2, 14.2			10.340	11.7, 9.8		
Average:		9.241	11.02			9.292	9.73		
Std. Dev.:		0.456	1.14			0.432	0.89		

Test No.: 44 Date: 5/26/69 Time: 1016-1140

Shelter No.: 1

Type of boxes: Code: C Description: Untreated spruce Conditioning: One coat MIL-C-46081 paint (applied 5/20)

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C351	1	9.900	9.7, 10.0			10.160	9.5, 9.3		
C352	2	9.120	9.4, 9.2			9.390	9.3, 9.0		
C353	3	9.095	9.4, 9.5			9.370	9.1, 9.4		
C354	4	9.095	10.2, 9.8			9.330	9.4, 9.7		
C355	5	9.140	11.0, 10.2			9.370	9.9, 9.7		
C356	6	9.075	10.7, 11.0			9.285	8.4, 9.7		
C357	7	9.345	9.3, 10.2			9.570	9.1, 9.3		
C358	8	8.700	8.9, 10.2			8.925	9.1, 8.7		
C359	9	8.885	10.0, 11.0			9.065	10.1, 9.2		
C360	10	8.525	9.0, 10.0			8.735	10.3, 9.4		
Average:		9.088	9.94			9.320	9.38		
Std. Dev.:		0.371	0.65			0.386	0.45		

Test No.: 44 Date: 5/26/69 Time: 1016-1140
 Shelter No.: 2
 Type of boxes: Code: C Description: Untreated spruce Conditioning: Two coats MIL-C-46081 paint (applied 5/20 and 5/21)

Box No.	Position in pile	Before conditioning		After conditioning		Prior to burning		After burning	
		Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %	Wt, kg	Moist., %
C341	1	9.020	8.6, 8.7			9.385	8.0, 8.5		
C342	2	9.415	8.5, 9.2			9.800	8.0, 8.4		
C343	3	9.445	8.7, 8.7			9.855	8.1, 8.3		
C344	4	9.480	8.9, 9.8			9.885	8.6, 8.7		
C345	5	10.540	9.2, 9.0			10.935	8.3, 8.2		
C346	6	9.125	8.4, 9.4			9.575	8.3, 8.8		
C347	7	9.525	9.0, 9.3			9.900	8.8, 8.8		
C348	8	9.650	9.2, 9.2			10.075	9.0, 8.4		
C349	9	8.735	9.1, 9.2			9.100	9.0, 9.0		
C350	10	9.660	10.0, 9.9			10.055	9.4, 9.2		
Average:		9.460	9.10			9.854	8.59		
Std. Dev.:		0.481	0.44			0.486	0.40		

APPENDIX C

METHOD USED TO DETERMINE RESIDUAL SOLVENT AND VOLATILE ORGANICS

A. Determination of Solvent in Treated Wood.

Prepare the apparatus as shown in figure C-1. Place dry ice and acetone in first Dewar Flask and liquid nitrogen in the second Dewar Flask.

Weigh a 25- to 50-gram sample (in one to five pieces) into the vacuum desiccator. Heat for 5 hours at 128° to 130°C under vacuum. Check for possible freezing of the traps three times during the course of the 5-hour run by momentarily opening the stopcock before the desiccator. If the system is frozen, remove the traps, allow them to warm up almost to room temperature, and immediately reconnect the system.

At the end of the 5-hour run, remove the traps, and allow them to warm up almost to room temperature. Immediately decant the liquid (mostly water) from the two traps into one 100-ml separatory funnel, wash the two traps with a total of about 30 ml of methylene chloride and decant the washings into the separatory funnel. Stopper the separatory funnel, shake for 2 minutes, allow the layers to settle for about 1 minute, and decant the methylene chloride (lower layer) into a clean dry 50-ml volumetric flask. Extract with a second portion (15 ml) of methylene chloride and combine with the first extract in the volumetric flask. Dilute to the mark with methylene chloride and shake.

Inject a 5-ml portion of the methylene chloride solution into a gas chromatograph containing an Apiezon L column. The following conditions are recommended using the Hewlett-Packard model 5750 gas chromatograph: stainless steel dual columns (6 feet by 1/8 inch) containing 5 percent Apiezon L on 80 to 100 mesh Distoport S; programmed temperature from 100° to 250°C at 4°C per minute; flame detector; injection port temperature 275°C; detector temperature 275°C; range 10³; and attenuation, variable.

Run a blank determination with 5 ml of methylene chloride.

Determine the total area under all the peaks except the peaks due to methylene chloride by use of a planimeter. Convert these total areas to an attenuation of 1 by multiplying by the attenuation used

for the run. Calculate a factor (grams of solvent per square inch at attenuation of 1) by use of 5 ml of a standard solvent solution in methylene chloride. The solvent should be of the same type as was used in the wood treating process. This laboratory, for example, used a solution containing approximately 2.0 grams of AMSCO mineral spirits (weighed to 0.1 mg) per 50 ml of methylene chloride. Calculate the percent solvent in the wood as follows:

$$\% \text{ solvent in wood} = \frac{\text{factor} \times \text{area (at attenuation of 1)}}{\text{grams of wood}} \times 100$$

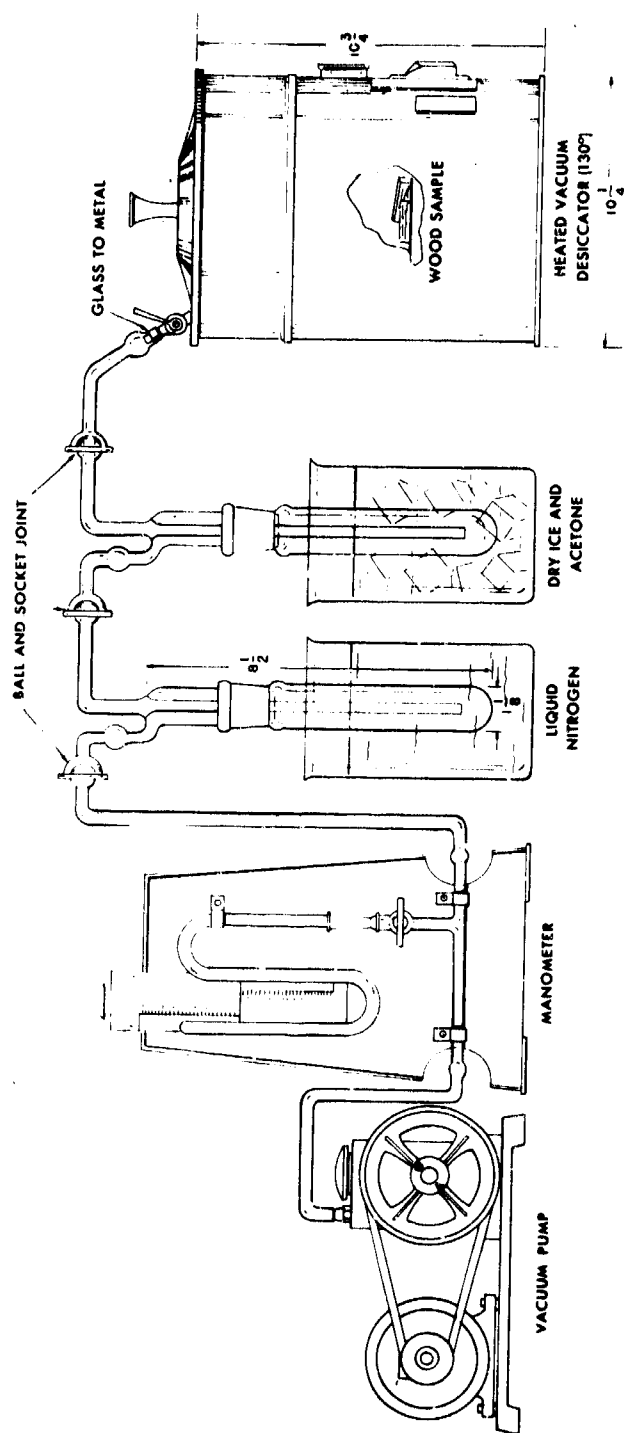


Figure C-1. Apparatus for Distillation of Solvent From Wood

B. Typical Chromatograms of Solvent and Volatile Fractions From Boxes.

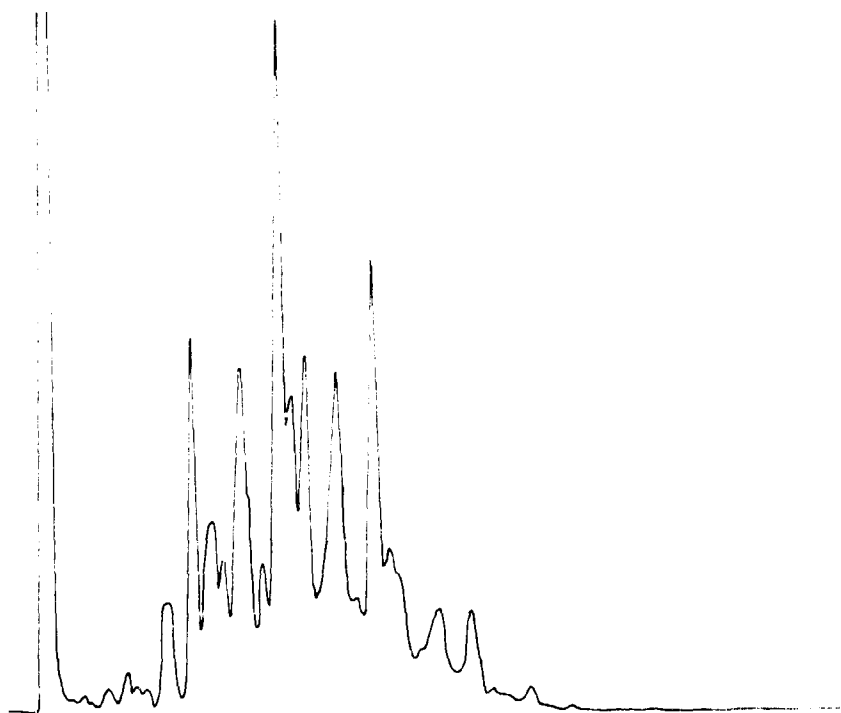
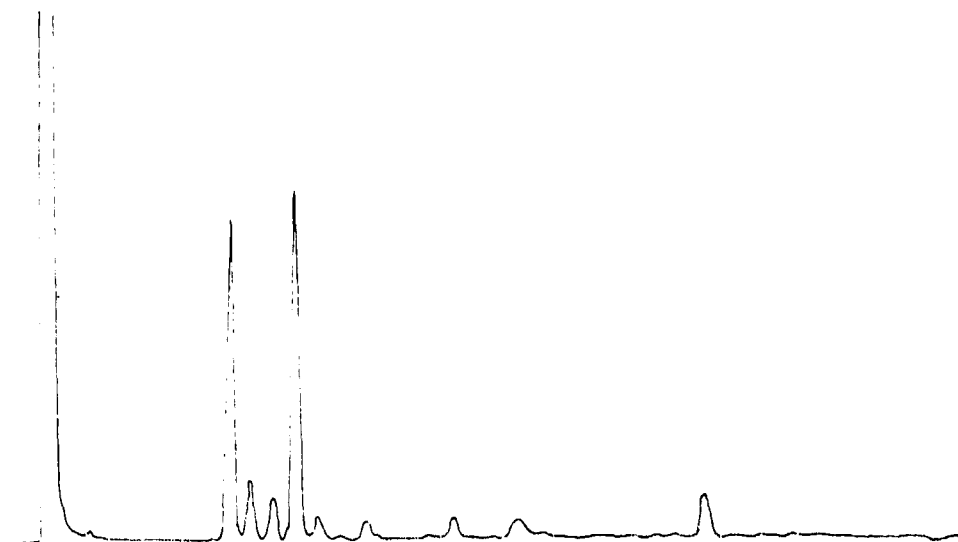


Figure C-2. Chromatogram of Mineral Spirits Solvent. Attenuation was 16X. Large Peak on Left is Due to Methylene Chloride



**Figure C-3A. Chromatogram of Sample From Test 26-1;
Untreated Spruce, Code C, as Received. Attenua-
tion was 16. Residual Solvent and Volatile Content
was 0.69 Percent**



**Figure C-3B. Chromatogram of Sample From Test 26-2;
Untreated Spruce, Code C, Freshly Dipped in
Preservative Solution. Attenuation was 2.
Residual Solvent and Volatile Content was
0.15 Percent**

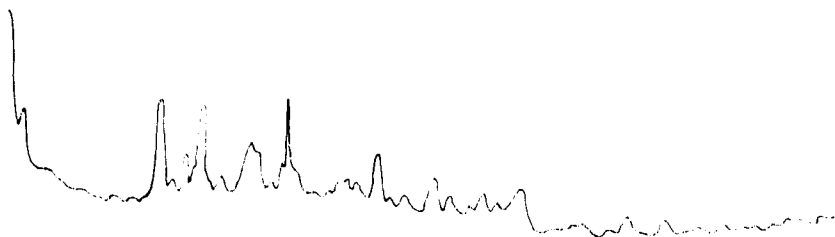


Figure C-4A. Chromatogram of Sample From Test 35-1; Treated Southern Yellow Pine as Received, Code F., Attenuation was 1. Residual Solvent and Volatile Content was 0.05 Percent

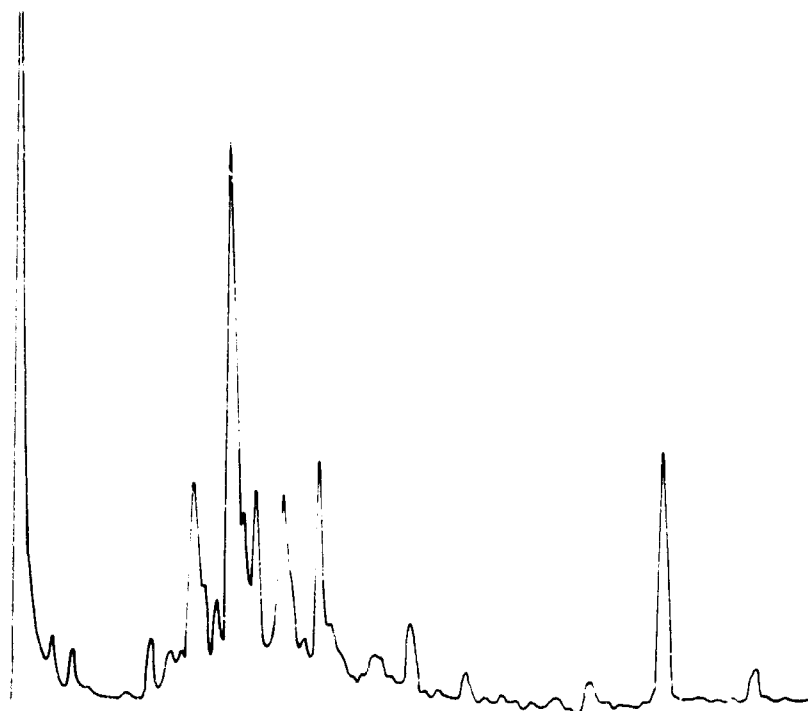


Figure C-4B. Chromatogram of Sample From Test 33-2; Treated Southern Yellow Pine Freshly Redipped in Preservative Solution. Attenuation was 2. Residual Solvent and Volatile Content was 0.28 Percent

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APPENDIX D

ANALYSIS OF MIL-B-52024B PAINT

TEST REPORT		
COATING AND CHEMICAL LABORATORY ABERDEEN PROVING GROUND, MARYLAND		
LABORATORY REPORT OF TESTS ON MILITARY SPECIFICATION MIL-P-52024B (MR) PAINT, FIRE RETARDANT, OLIVE DRAB (FOR WOODEN CRATES)		
SUBMITTED BY:	BERKELY PRODUCTS Euphrata, Pa	REPORT NO: 27,116
PURPOSE OF TEST:	SURVEILLANCE	SIZE OF SAMPLE: 1 Qt
RECOMMENDATION: Fire Retardancy-Satisfactory DOES NOT MEET SPEC. REQUIREMENTS		MFG. CODE NO:
COMPOSITION		ANALYSIS
1. Total solids, % by weight of paint		68
2. Pigment, % by weight of paint		44
3. Vehicle solids, % by weight of paint		24
VEHICLE SOLIDS COMPOSITION		
4. Chlorinated Dibasic acid, % by weight of vehicle solids		Neg.
5. Chlorine, % by weight of vehicle solids		21
6. Oil acids, % by weight of vehicle solids		41
7. Rosin		Pos.
8. Phenolic resins		Neg.
PIGMENT COMPOSITION		
9. Antimony Trioxide (Sb ₂ O ₃), % by weight of pigment		Neg.
10. Total lead (as PbSO ₄), % by weight of pigment		38
11. Chromium (as PbCrO ₄), % by weight of pigment		11
12.		
13.		
14.		
15.		
16.		
17.		
QUANTITATIVE PROPERTIES		DETERMINED
18. Specular Gloss, 60°		Under 1
19. Fineness of grind		4
20. Coarse particles & skins, % by weight of pigment		Under 1.0
21. Water, % by weight of paint		Under 1.0
22. Consistency (package) K. U.		72
23. Drying, set to touch, minutes		Under 30
24. Drying, hard, hours		Under 8
25. Hiding power		1.0
26. Fire retardancy, burn index		27
27.		
28.		
29.		
30.		
31.		
32.		

ORDBG Form 2100-(R)
2 Jul 57

QUALITATIVE PROPERTIES	RESULTS	PARAGRAPH
33. Color	(1) Fail	3.4.1
34. Condition in container	Satis	3.4.2
35. Storage stability	In Progress	3.4.3
36. Dilution stability	Satis	3.4.4
37. Brushing properties	Satis	3.4.5
38. Spraying properties	Satis	3.4.6
39. Adhesion	Satis	3.4.7
40. Flexibility	Satis	3.4.8
41. Weather resistance	In Progress	3.4.9
42. Accelerated weathering	----	3.4.10
(a) Chalking	Satis	
(b) Color change	Satis	
(c) Film deterioration	Satis	
43. Water resistance	(2) Fails	3.4.11
44. Toxicity	Satis	3.4.12
<p>45. Remarks:</p> <p>(1) Fails - Color is too dark and too blue</p> <p>(2) Fails - Poor adhesion after immersion in water</p> <p>Vehicle Solids + Pigment Composition do not meet the requirements of the Specification</p> <p>Item 26. 17.2 Average loss of weight (%)</p> <p> 23.9 Char length</p> <p> 39.4 Flame spread</p> <p> 3 80.5</p> <p> 26.8 = 27</p>		
TESTED BY: DATE	CHECKED BY: DATE	APPROVED BY: DATE
K. Smith 5-19-69		/s/C. W. Preston /t/C. W. Preston 6-19-69

ORDBG Form 2100a-(R)
2 Jul 57

CHEMICAL REPORT

RECEIVAL NUMBER 27116

COLOR OD

DATE 5/19

SPECIFICATION 52024

TYPE Fire ret.

W.O.

		TEST RESULTS	REQUIRE- MENT	
TOTAL PAINT	SOLIDS	67.6	67	
	PIGMENT	43.7	42	
	ASH			
	COARSE PARTICLES			
	WATER			
VEHICLE Chlorinated paraffin with alkyd resin	SOLIDS	42.5	43.1	
	PHTHALIC ANHYDRIDE			
	ROSIN	pos.	N	
	PHENOL	Neg.	N	
	OIL ACIDS spec. method	40.5%	44	
	UNSATURATED ACIDS			
	ACID NUMBER			
	IODINE NUMBER			
	NITROCELLULOSE			
	SATURATED ACIDS			
	ETHYLENE GLYCOL			
	REFRACTIVE INDEX			
	FISH OILS			
	AMINE NITROGEN			
	EPOXY RESIN			
	CHLORENDIC ACID	none	46	
	CHLORINE	20.6%	23	
	SILICA			
	VINYL RESIN			
	NITROGEN RESIN			
VOLATILE	ESTERS			
	KETONES			
PIGMENT (see sheet)	FERRIC OXIDE			
	MAGNETIC IRON OXIDE			
	CHROMIUM TRIOXIDE			
	ZINC CHROMATE			
	LEAD CHROMATE Method 7111	10.9	13	
	TOTAL LEAD as PbSO ₄	38.4	22	
	RED LEAD			
	TITANIUM DIOXIDE			
	ZINC OXIDE			
	BASIC LEAD SILICO CHROMATE			
	ACID INSOLUBLE			
	ASH			
	TOLUIDINE			
	WHITE LEAD			
	ANTIMONY TRIOXIDE	none	7.0 min.	
	CALCIUM OXIDE (in acid insoluble)			

AMXCC Form 1006, 17 Feb 64 (Repl AMXCC Form 2083-(R), 7 Jan 63)

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
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		2b. GROUP NA
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4. DESCRIPTIVE NOTES (Type of report and inclusive dates) The work was started in March and completed in May 1969.		
5. AUTHOR(S) (First name, middle initial, last name) Norman Reich and Leonard Teitell		
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10. DISTRIBUTION STATEMENT Each transmittal of this document outside the agencies of the US Government must have prior approval of the Commanding Officer, Edgewood Arsenal, ATTN: SMUEA-TSTI-T, Edgewood Arsenal, Maryland 21010.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT (U) This report covers an investigation to compare the fire hazards of untreated and preservative-treated wooden packing boxes used for ammunition. Based on test results, it is concluded that: The water-repellent, wood-preservative treatment, specified in MIL-B-2427D for application to wooden packing boxes used for ammunition, does not increase the flammability of the wood. Boxes constructed of ponderosa pine constitute more of a fire hazard than boxes constructed of southern yellow pine. The fire hazard of the packing boxes is dependent upon the moisture content of the wood, and the water repellent part of the treatment may keep the wood drier, lighter in weight, and somewhat more flammable when subjected to intermittent rain showers. Flammability of the boxes is also affected by the amount of organic volatiles present, including the solvent of the preservative solution until it finally evaporates, which occurs at a rate dependent upon the temperature and amount of ventilation; however, during the treating process, the solvent of the preservative solution extracts some of the naturally occurring volatiles in the wood, thus lowering the fire hazard. The fire hazard of the preservative-treated packing boxes can be considerably reduced by applying an adequate thickness of fire-retardant paint coating to the exterior surfaces.		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Fire test						
Flammability rating						
Wooden packing box						
M105A2 packing box						
Fire-retardant coating						
Intumescent paint						
Southern yellow pine						
Angelmann spruce						
Ponderosa pine						
105-mm howitzer ammunition						
Wood preservative treatment						
Federal Specification TT-W-572						
Military Specification MIL-B-2727D						
Military Specification MIL-C-46081						
Military Specification MIL-P-52024B						